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The major purpose of this guide is to elicit the information needed for the writing of educational specifications used in the planning of educational facilities for electrical technology programs. It is for use by instructors, supervisors, school plant planners, and local school officials. Part I is a discussion of the recent trends which were utilized in the preparation of the guide. Part II provides data collection instruments covering basic electrical program features, objectives, and the kinds of programs organized to implement the objectives. Part III contains data collection instruments covering the facts relative to the actual desired space. Part IV is an annotated bibliography of 24 related items published between 1959 and 1968. Fifteen data collection instruments are included. A related document is "A Guide to Systematic Planning for Vocational and Technical Schools" (VT 007 825). (EM)

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THE CENTER FOR VOCATIONAL
AND TECHNICAL EDUCATION
THE OHIO STATE UNIVERSITY
1900 Kenny Rd., Columbus, Ohio, 43210

A GUIDE FOR PLANNING FACILITIES FOR OCCUPATIONAL PREPARATION PROGRAMS in ELECTRICAL TECHNOLOGY

VT007989

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Comprehensive and Vocational Education Research, U. S. Office of Education. It serves a catalytic role in establishing consortia to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;

2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;

3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;

4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;

5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and inservice education program;

6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Resources Information Center located in the U. S. Office of Education.

RESEARCH SERIES NO. 30

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A GUIDE FOR PLANNING FACILITIES FOR OCCUPATIONAL PREPARATION PROGRAMS IN ELECTRICAL TECHNOLOGY

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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FOREWORD

One of the most fundamental concerns in planning for vocational and technical education facilities is that of assuring that educational requirements dictate the nature of the facilities. Other concerns include planning a sufficiently adaptable and flexible structure to permit needed modifications and programmatic changes over the lifetime of the building. Experiences have shown that adequate manuals and guide materials can provide substantial assistance in planning educational facilities. This document is a guide for planning facilities for occupational preparation programs in electrical technology. The information recorded in the guide is to be used in the preparation of educational specifications.

The guide lists a series of pivotal questions about the educational program to be offered. The answers to these program questions bear directly on the numbers and kinds of instructional areas needed in the contemplated facilities. After program decisions are recorded, the guide provides for the description of instructional areas needed to meet program requirements. Much of the material is presented in a checklist format which allows for consideration of alternatives in facility planning.

The guide was designed for use by any person or groups of persons responsible for planning electrical technology training facilities. It is anticipated that knowledgeable persons such as electrical technology instructors, state supervisors, university school plant planners, and local administrators will find the guide a useful planning tool. The guide can also be used for instructional purposes at universities, colleges, seminars, and institutes.

This guide is the eighth in a series being developed by The Center. Subsequent guides will be published for dental technology and medical technology. The first seven guides developed were in the fields of home economics, machine trades, data processing, business and office occupations, animal science technology, metallurgy technology, and automotive services. All guides follow the general format developed by The Center project staff and M. J. Conrad, head, Administration and Facilities Unit, College of Education, The Ohio State University. Vocational educators should also refer to the basic guide, A Guide to Systematic Planning for Vocational and Technical Education Facilities.

The Center for Vocational and Technical Education, The Ohio State University, worked cooperatively with L. J. Sitterlee, chairman and the staff of the Electrical Technology Department of Broome Technical College, Binghamton, New York, in preparing this planning guide. Center project staff members were Richard F. Meckley, Ivan E. Valentine, and Zane McCoy.

The Center is grateful to the many individuals and groups whose assistance and suggestions led to the successful conclusion of the project. Special appreciation is due William A. McIntosh, associate professor, North Carolina State University, for thoughtful and helpful review of the initial draft of the guide.

Robert E. Taylor
Director
The Center for Vocational
and Technical Education

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A GUIDE FOR PLANNING FACILITIES FOR OCCUPATIONAL PREPARATION PROGRAMS IN ELECTRICAL TECHNOLOGY

PART I

INTRODUCTION

PURPOSE OF GUIDE

The major purpose of this guide is to elicit the necessary information for the writing of educational specifications for facilities to house needed programs in electrical technology. The guide was developed as a facility planning tool for use by such knowledgeable persons as electrical technology instructors, state supervisors, school plant planners, and local school officials.

In addition to providing important and comprehensive information to be incorporated in educational specifications, the guide is also designed to:

- Assist planners in the formation of creative solutions to the housing of desired educational programs.
- Prevent important considerations from being overlooked in the facility planning process.
- Encourage logical and systematic facility planning.

ORGANIZATION OF GUIDE

The facility planning guide is organized under four major headings or parts. Part I (Introduction) is a discussion of the major purpose, the underlying assumptions, the guiding principles, and recent trends which were utilized in the preparation of the guide.

In Part II (The Instructional Program) important information is sought on the electrical technology department basic program features, objectives, and the kinds of programs which will be organized to implement them.

In Part III (Distinct Types of Instructional Areas to be Provided) the actual spaces desired to house the programs are described in detail.

Part IV is an annotated bibliography of reference sources which offer a more detailed treatment of the various phases of facility planning.

UNDERLYING ASSUMPTIONS

Important assumptions were made in the preparation of this guide. They were:

- Major educational program decisions have or are being made. Content of instruction has been determined through educational surveys, advisory committees, school board study, etc. Instructional methods have been determined by qualified electrical technology and other appropriate staff members. To assure adequate educational program planning, the guide will ask important questions which may serve as guidelines to such planning.
- A cooperative and collaborative relationship has been established with knowledgeable local agencies who are aware of economic, political, and social conditions which must be taken into account in short- and long-range educational planning.
- Educational, economic, political, and social planning has revealed the approximate numbers and kinds of students (school-age and adult) to be served by the proposed school. Such information has been provided by enrollment projections, census tract data, student interest studies, etc.
- The information recorded in this document will be used in the preparation of educational specifications for use by an architect(s) in facility design. Sufficient funds are or can be made available to support both the provision of facilities and the operation of the desired occupational preparation programs.

RECENT TRENDS

- Expanded programs to reach not only the average and those who are college bound, but also the unusually gifted, the physically handicapped, the mentally retarded, and the culturally disadvantaged are needed and being provided by occupational preparation programs.
- Cooperation among instructors in developing interdisciplinary units or courses is increasing. Cooperative instruction is encouraged and facilitated by the proximity of instructional and work areas where the teachers can plan together and produce instructional materials.

- Mobile equipment and convenient space for storing it is making the same space available for many purposes and resulting in more effective and efficient use of space.

- Mechanical and electronic teaching aids are being utilized to a greater degree by instructors in occupational preparation programs. To some extent, the effective use of such devices depends upon the accessibility and convenience of storage.

GUIDING PRINCIPLES

In planning facilities to house occupational preparation programs, it is suggested that educational program and facility decisions be consistent with the following guiding principles.

- The educational program is the basis for planning space and facilities.
- Space and facilities should be planned to accommodate changes in the educational program.
- The program should be planned to serve the needs of a variety of groups in the community.
- Space and facilities for the program can be extended through the use of community resources.
- Safe and healthful housing must be provided for all students.
- Space and facilities for occupational preparation programs should be considered in context with the total educational program of the institution and the community.

PART II

THE INSTRUCTIONAL PROGRAM

Part II of the guide records important instructional program decisions with respect to basic program features, objectives, and needed information on occupational preparation programs to be housed.

BASIC PROGRAM FEATURES

Basic features of the educational program are determined greatly by a school or department's educational philosophy. A philosophy of education provides a base from which program objectives and teaching and learning activities designed to meet these objectives can be derived. In the final analysis, it is the kinds of teaching and learning activities to be carried on which should determine facility needs.

In this section, planners have an opportunity to express basic program features which will serve as guidelines for the planned occupational preparation programs in electrical technology.

Indicate below the relative degree of emphasis to be placed on each of the program features stated by circling the appropriate number. The scale provided for this purpose ranges from 1 for major emphasis, 2 for some emphasis, 3 for slight emphasis, to N for no emphasis. This same scale will be used frequently throughout the planning guide.

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. Purpose of Program

   a. The purpose of the program will be the preparation of students for gainful employment. 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

b. The purpose of the program will be the preparation of students for entry into further training programs. The nature of this further training is ______________
____
______________________________ 1 2 3 N
____

c. Other program purposes which should be included are:
  1) ______________________________
  2) ______________________________
  3) ______________________________
  4) ______________________________

2. Students

a. Students will be selected for entrance into the program. The basis for selection will be:
  1) ______________________________
  2) ______________________________
  3) ______________________________
  4) ______________________________

b. The program will place emphasis on skill acquisition. 1 2 3 N

c. The program will place emphasis on the learning of theory. 1 2 3 N

d. Students will have freedom of movement and access to learning materials. 1 2 3 N

e. Students will be encouraged to act independently. 1 2 3 N

f. Students will be provided with cooperative work experience outside the school. 1 2 3 N

g. Other basic program features in relation to students include:
  1) ______________________________
  2) ______________________________
  3) ______________________________
  4) ______________________________

3. Instruction

a. The instructional approach will be single discipline (electrical technology) as opposed to interdisciplinary (electrical technology, science, etc.). If not a single discipline approach, describe the interdisciplinary approach and the disciplines involved. ______________________ Yes No
____

b. Cooperative or team instruction will be used. If this mode of instruction is to be extensively emphasized, describe in general terms. ______________________
____
____
______________________________________ Yes No

c. Community resources will be utilized in instruction. If a high emphasis is to be placed on use of community resources, describe some of these resources. _____
____
____
______________________________________ Yes No

d. Instructional flexibility is required. If a high emphasis is to be placed on instructional flexibility, please describe the kinds of flexibility desired. _________
____
____
______________________________________ Yes No

4. Other basic program features important to the planned instructional program:

a. ______________________________________
____
b. ______________________________________
____
c. ______________________________________
____
d. ______________________________________
____

EDUCATIONAL OBJECTIVES

Educational objectives are often identified as goals or outcomes of the educational program. An objective should describe a desired educational outcome that is consistent with a school's philosophy.

Objectives are important to both the planner and the architect since they determine the school's program and related activities. They provide important implications which when translated into facilities can both enhance as well as adequately house the desired program. Thus it becomes imperative to clearly establish the program objectives prior to embarking on educational specifications and subsequent building design.

The purpose of this part of the guide is to bring together these elements in a way to provide direction and understanding for both the planner and the architect. Space is provided below to indicate degree of emphasis by circling the appropriate number for each of the objectives, and to list additional objectives. The scale provided for this stated purpose ranges from 1 for major emphasis down to N for no emphasis.

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. To prepare individuals for entry into gainful employment as technicians 1 2 3 N

2. To give the individual enough background so that he may formally or informally continue his education 1 2 3 N

3. To prepare individuals to be useful citizens in their community 1 2 3 N

4. In order that the electrical technician may be well prepared, the following subject area objectives are emphasized:

    a. Mathematics: mathematical principles required for direct application to physics, electrical and electronic problems. 1 2 3 N
    b. Engineering drawing and design: basic drafting and design (with supplemental sketching) applied to the electrical field, such that the graduate may understand electrical and electronic diagrams, equipment construction diagrams, and various graphic descriptions. 1 2 3 N
    c. Technical subject matter: physics, networks, electronics, computer programming, machines, and controls to present the theory and physical concepts of the electrical field. 1 2 3 N
    d. Laboratory experience: to enable students to obtain practical experience in manufacturing processes, electricity, electronics, physics, rotating machinery, controls, and computer programming. Laboratory experience supplements theoretical training by inabling students to use modern equipment similar to that found in industry. 1 2 3 N
    e. General education: English, social studies, and economics so that the student may be articulate and be aware of social and economic trends. Industrial relations, and industrial organization and management enable the student to understand industrial practices and the function of industry in our society. 1 2 3 N
    f. Electives: mathematics, engineering economics, and introduction to system logic provide for additional growth and familiarity with current engineering practices. 1 2 3 N
    g. Electrical construction and maintenance: familiarize the individual with present

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

shop practices so that he may 1) talk intelligently with the skilled craftsman, 2) supervise the construction of a project, or 3) build and test the project in a model shop. 1 2 3 N

5. Other program objectives include:

a. ____
____

b. ____
____

c. ____
____

d. ____
____

PROGRAM CONTENT AREAS

The educational program in electrical technology should be designed to meet its established objectives. All decisions made with respect to educational programs should be consistent with established philosophy and objectives.

In occupational preparation programs, the courses or units of instruction emphasize the student's acquisition of knowledge and the development of understanding, attitudes, and skills relevant to occupational preparation and the utilization of specialized skills of electrical technology. Learning activities and experiences are organized to enable students to develop competencies essential for entry into their chosen occupations, to further training, or to acquire new or additional competencies for upgrading their occupational profession.

Instruction in occupational preparation electrical technology is usually given in overlapping subject areas or courses. Subject matter is coordinated with appropriate field, laboratory, and work experience.

Programs in electrical technology can be classified under the broad headings or content areas of 1) Electrical Machines and Power; 2) Manufacturing Processes, Electrical Construction, and Maintenance; 3) Circuits and Physics; 4) Electronics; 5) Engineering Drawing; 6) Computer Programming; and 7) Computer and Control Systems. These seven content areas relate directly to the field of electrical technology and can be used to categorize most occupational preparation programs in the field. However, students in various electrical technology programs often elect or are required to take courses in subjects such as English, mathematics, and physical education which are available to all students. For example, a first-year community college student might take the following courses or units:

Courses	Content Areas
English	Academic
Mathematics I	Academic
Manufacturing Processes	Manufacturing Processes, Electrical Construction, and Maintenance
Industrial Safety	Academic
Physics	Circuits and Physics
Engineering Drawing	Engineering Drawing

The concept of content areas is used in this planning guide because different instructional content areas usually call for different kinds of instructional facilities and equipment. The following content areas which usually call for specialized instructional areas are used in this guide.

- Electrical Machines and Power
- Manufacturing Processes, Electrical Construction, and Maintenance
- Circuits and Physics
- Electronics
- Engineering Drawing
- Computer Programming
- Computer and Control Systems
- Academic
- Science (other than circuits and physics)
- Music
- Physical Education
- Other (This category is used in the event that a course or unit to be offered will not fit into any of the above content areas.)

PLANNING INSTRUCTIONAL AREAS BY MODES OF LEARNING

The planning of instructional areas for occupational preparation facilities can be substantially aided through utilization of the concept of modes of learning. Learning can be divided into three distinct modes--*reaction* learning, *interaction* learning, and *action* learning.

Reaction learning, which usually occurs in an instructional area designed for *lecture and demonstration*, is characterized by activities which tend to be largely teacher-centered with the central focus on instruction. Student activities include listening, observing, and the taking of notes. Group size may vary from one to a very large number as the number of students has little effect on the learning experience if proper technological aids such as television, microphones, projectors and the like are used. Because student activities are relatively passive in reaction learning, a short optimum time span is normally employed.

Lecture/demonstration areas can be used commonly for reaction learning in all subject areas. For example, in planning facilities for two diverse occupational preparation programs in electrical technology such as electrical machines and automatic controls, the planner should bear in mind that reaction learning for students in both programs can occur in the same kind of instructional area. This means that facility planning should be done in terms of the total program rather than its fractional parts. In many instances, lecture/demonstration areas can be shared not only by occupational preparation programs within vocational service areas, but also shared by distinct and dissimilar service areas such as electrical circuits and physics. Where a great deal of facility sharing is planned, the planner should consider the optimal location within the total building and the advisability of clustering various instructional areas.

Interaction learning, which usually occurs in a seminar instructional area, is characterized by both teacher and learner activity participating as both listener and speaker. This mode of learning, of course, most occur in groups; however, sociological research suggests these groups should not exceed 15 persons for optimal effectiveness. Active interaction of all students generally requires a longer time span than reaction learning.

Seminar areas, like lecture/demonstration areas, are usually designed for common use by all students regardless of programs in which they are enrolled. The same considerations which were outlined for lecture/demonstration areas also apply to seminar areas.

Action learning, which usually occurs in a laboratory instructional area, allows the individual student to learn by doing. Students learn on an individual basis, but may, nevertheless, function in a group setting. Often in more flexible educational programs, students are scheduled for laboratory work on an individual basis. Since action learning involves overt action by individual students, the teacher's role is largely that of a consultant to the learner.

Laboratory areas, of necessity, are more specialized than lecture/demonstration areas used for reaction learning and seminar areas used for interaction learning. Since laboratory areas are designed to facilitate the learning of specific skills, there is less likelihood of sharing such areas by students in various vocational training programs. However, wherever common elements of skill instruction are found among vocational training programs, the possibility of sharing and clustering laboratory facilities can be both expedient and economical.

SPECIALIZED AND MULTI-USE OF INSTRUCTIONAL AREAS

The relative amounts of time to be spent by students in a given vocational program in reaction, interaction, and action learning has definite implications for the number and kind of spaces to be provided. These time considerations combined with decisions on the degree of specialization versus multi-use help determine the nature of facilities required. Since most vocational programs have concentrated on action learning experiences, facilities designed for a particular vocational program have seldom provided adequate reaction and interaction facilities because of the limited utilization of such spaces. However, if the learning activities in any vocational program are broken down into the modes of learning, it will be noted that reaction and interaction spaces are the same regardless of the vocational area. Therefore, by providing common reaction and interaction spaces for all vocational programs, the most modern technological aids can be justified which, in most cases, will permit lectures, demonstrations and other group reaction learning experiences for groups larger than typically used in vocational education programs. Not only will group reaction learning be improved but more time will become available for the professional staff to work with individuals and small groups in interaction and action learning activities.

Scheduling group reaction and interaction learning experiences into specialized facilities permits complete flexibility in the use of action learning laboratories on an open individualized basis since students would no longer need to be scheduled into the action learning laboratories on a specific class basis. This will permit 100 percent room utilization of the action learning laboratories and also permit the introduction of differentiated staff assignments into vocational education.

The open laboratory concept also permits the planned sharing of certain specialized equipment which may be required by two or more vocational programs.

NOTE: THE FOLLOWING SECTIONS OF THE GUIDE (PAGES 16-36) WILL ASSIST THE PLANNER IN MAKING MATHEMATICAL DETERMINATION OF THE NUMBER OF INSTRUCTIONAL AREAS NEEDED TO HOUSE THE DESIRED PROGRAM. IF THE NUMBER OF INSTRUCTIONAL AREAS REQUIRED ARE ALREADY KNOWN, PLANNERS MAY NOW PROCEED TO FORM E, PAGE 37. IF, HOWEVER, MATHEMATICAL DETERMINATIONS ARE TO BE MADE, ALL FORMS SHOULD BE COMPLETED AS ACCURATELY AS POSSIBLE.

OCCUPATIONAL PREPARATION PROGRAMS TO BE OFFERED

Information on each electrical technology occupational preparation program to be offered is entered on a separate Form A which follows. Directions for completing Form A(s) appear on pages 16 and 17. To assist planners, a sample of a completed Form A is given on page 19. Data entered in the sample of Form A are for an electrical technology training program. The data were assumed for purpose of illustration.

Form A for each occupational preparation program should be filled out as completely as possible. However, it is realized, for example, that an electrical technology instructor completing

Form A may be unaware of time allotments and methods of instruction in other subject areas. If such is the case, the instructor can only supply information on courses within the content areas of electrical technology.

INSTRUCTIONS FOR COMPLETING FORM A
BASIC PROGRAM INFORMATION

Item 1
Occupational Preparation Program--Enter the name of the occupational program to be offered, e.g., electrical technology, electronics technology, etc.

Item 2
Yearly Enrollment--Enter the projected maximum number of students to be enrolled yearly in the program.

Item 3
Nature of Students--Underline all categories which apply to the students to be enrolled in the program.

Item 4
Weeks of Instruction per Year--Enter the number of weeks per year the school will be open for instruction, e.g., 36 weeks, 52 weeks.

Item 5
Total Weekly Periods or Modules--Enter the total number of periods or modules (if modular scheduling is to be used) per week available for instructional purposes for each student. Do not count periods or modules scheduled for lunch and other non-instructional purposes.

Column 6
Courses of Instruction--List the courses or units of instruction to be offered either on a required or elective basis for the occupational preparation program.

Column 7
Content Area--Opposite each course of instruction, enter the appropriate content area as presented on page 11.

Column 8
Total Course Enrollment--Opposite each course of instruction, enter the projected maximum student enrollment.

Column 9
Maximum Group Size for Reaction Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for reaction (lecture/demonstration) type learning.

Column 10

Estimated Weekly Periods or Modules of Reaction Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to reaction learning per student.

Column 11

Weekly Group-Periods or Modules (Lecture/Demonstration)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 9 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 10.

Column 12

Maximum Group Size for Interaction Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for interaction (seminar) type learning.

Column 13

Estimated Weekly Periods or Modules of Interaction Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to interaction learning per student.

Column 14

Weekly Group-Periods or Modules (Seminar)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 12 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 13.

Column 15

Maximum Group Size for Action Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for action (laboratory) type learning.

Column 16

Estimated Weekly Periods or Modules of Action Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to action learning per student.

Column 17

Weekly Group-Periods or Modules (Laboratory)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 15 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 16.

SAMPLE FORM A
BASIC PROGRAM INFORMATION

1. Occupational Preparation Program *Electrical Technology (first year)*
2. Yearly Enrollment *120*
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) *post high school*
4. Weeks of Instruction per Year *33*
5. Total Weekly Periods or Modules *40*

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
(6)	(7)	(8)	Maximum Group Size (9)	Weekly Periods or Modules (10)	Weekly Group-Periods or Modules (11)	Maximum Group Size (12)	Weekly Periods or Modules (13)	Weekly Group-Periods or Modules (14)	Maximum Group Size (15)	Weekly Periods or Modules (16)	Weekly Group-Periods or Modules (17)
English	*Acad.*	*120*	*30*	*3*	*12*						
Math	*Acad.*	*50*	*30*	*4*	*8*						
Manufact. Processes	*Mfg.Proc El.Con.Mt*	*120*	*30*	*1*	*4*				*15*	*3*	*24*
Industrial Safety	*Acad.*	*120*	*150*	*1*	*1*	*15*	*1*	*8*			
Physics	*Physics, Circuits*	*50*	*30*	*4*	*8*				*15*	*3*	*12*
Engineering	*Eng.*										
Drawing	*Drawing*	*120*							*30*	*3*	*12*

---

[1] If both day and night schools are to be offered, fill out separate forms for each.
*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

SAMPLE FORM A

FORM A
BASIC PROGRAM INFORMATION

1. Occupational Preparation Program ______________________________
2. Yearly Enrollment ____________
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) ____________________
4. Weeks of Instruction per Year ______________
5. Total Weekly Periods or Modules ______________

<table>
<tr><th rowspan="3">Courses of Instruction
(6)</th><th rowspan="3">Content Areas
(7)</th><th rowspan="3">Total Course Enrollment
(8)</th><th colspan="9">Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning</th></tr>
<tr><th colspan="3">REACTION*</th><th colspan="3">INTERACTION**</th><th colspan="3">ACTION***</th></tr>
<tr><th>Maximum Group Size
(9)</th><th>Weekly Periods or Modules
(10)</th><th>Weekly Group-Periods or Modules
(11)</th><th>Maximum Group Size
(12)</th><th>Weekly Periods or Modules
(13)</th><th>Weekly Group-Periods or Modules
(14)</th><th>Maximum Group Size
(15)</th><th>Weekly Periods or Modules
(16)</th><th>Weekly Group-Periods or Modules
(17)</th></tr>
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[1] If both day and night schools are to be offered, fill out separate forms for each.
*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A
BASIC PROGRAM INFORMATION

1. Occupational Preparation Program ____________________
2. Yearly Enrollment ____________
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) ____________________
4. Weeks of Instruction per Year ____________
5. Total Weekly Periods or Modules ____________

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
(6)	(7)	(8)	Maximum Group Size (9)	Weekly Periods or Modules (10)	Weekly Group-Periods or Modules (11)	Maximum Group Size (12)	Weekly Periods or Modules (13)	Weekly Group-Periods or Modules (14)	Maximum Group Size (15)	Weekly Periods or Modules (16)	Weekly Group-Periods or Modules (17)

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[1] If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A
BASIC PROGRAM INFORMATION

1. Occupational Preparation Program ______________________________
2. Yearly Enrollment ____________
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) ____________________
4. Weeks of Instruction per Year ______________
5. Total Weekly Periods or Modules ______________

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
(6)	(7)	(8)	Maximum Group Size (9)	Weekly Periods or Modules (10)	Weekly Group-Periods or Modules (11)	Maximum Group Size (12)	Weekly Periods or Modules (13)	Weekly Group-Periods or Modules (14)	Maximum Group Size (15)	Weekly Periods or Modules (16)	Weekly Group-Periods or Modules (17)

FORM A

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[1] If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A
BASIC PROGRAM INFORMATION

1. Occupational Preparation Program ______________________________
2. Yearly Enrollment ______________
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) ______________________
4. Weeks of Instruction per Year ______________
5. Total Weekly Periods or Modules ______________

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
(6)	(7)	(8)	Maximum Group Size (9)	Weekly Periods or Modules (10)	Weekly Group-Periods or Modules (11)	Maximum Group Size (12)	Weekly Periods or Modules (13)	Weekly Group-Periods or Modules (14)	Maximum Group Size (15)	Weekly Periods or Modules (16)	Weekly Group-Periods or Modules (17)

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[1] If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

PART III

DISTINCT TYPES OF INSTRUCTIONAL AREAS TO BE PROVIDED

QUANTITATIVE FACILITY NEEDS

The number of instructional areas to house the programs described in Part II (The Instructional Program) are recorded in this section of the guide.

As indicated in Part II, there are three principal types of instructional areas used to accommodate educational programs. They are:

Lecture/demonstration areas--used principally for group reaction learning;

Seminar areas--used principally for group interaction learning; and

Laboratory areas--used principally for group or individual action learning.

In addition to these instructional areas, there are, of course, other school-wide auxiliary areas such as instructional materials centers, language laboratories, gymnasiums, and auditoriums which are part of the overall school plan. Requirements for such facilities are calculated as a part of total school planning and are not made in this guide.

It is recommended that facility needs, including those for occupational preparation programs in electrical technology be made on a school-wide basis in order to provide planners with a balanced picture of the building to be constructed and to promote economy and convenience through the sharing and clustering of various kinds of facilities and equipment.

Forms B, C and D can be used to compute the number of lecture/demonstration, seminar, and laboratory areas required, respectively, for the planned programs in electrical technology occupational preparation. The use of these forms requires some mathematical ability. Personnel responsible for completing the guide may want to utilize the services of individuals with this special competence.

Results of the computations on Forms B, C and D are entered on Form E which is a summary of total instructional area requirements for electrical technology.

In the event that instructional area requirements are already determined (e.g., it has been decided that one combination laboratory and lecture/demonstration area will be provided) the information can be recorded directly on Form E without making the computations on Forms B, C and D.

It is strongly recommended that appropriate personnel be utilized to ensure that the number of instructional areas meets program requirements. After the number of each type of instructional area is determined and recorded on Form E, information can then be recorded in the following sections of the guide concerning the nature of these instructional areas.

INSTRUCTIONS FOR COMPLETING FORM B
LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Column 1

Content Area--Content areas are listed in Column 1.

Column 2

Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each content area as indicated in Columns 7 and 8 of Form A(s) for all occupational preparation programs.

Column 3

Maximum Group Size--Opposite each content area, enter the maximum group size desired for a lecture/demonstration area to serve the content area (Form A, Column 9).

Column 4

Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5

Total Weekly Reaction Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to reaction learning as indicated in Column 11 of Form A(s) for all occupational preparation programs.

Column 6

Lecture/Demonstration Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7.

Adjusted Lecture/Demonstration Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

Column 8

Totals--Since lecture/demonstration areas, unlike laboratory areas, can be utilized by nearly all content areas, the entries in Column 7 can be added for all lecture/demonstration areas with identical maximum group sizes as entered in Column 3. For example, 8a might read 2 lecture/demonstration areas with a student capacity of 50 each.

SAMPLE FORM B

LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Reaction Group-Periods or Modules (5)	Lecture/Demonstration Areas Required (5) ÷ (4) (6)	Adjusted Lecture/Demonstration Areas Required (6) X 1.3 (7)
Electrical Mach. and Power	--	--	--	--	--	--
Manuf. Processes, Elec. Const. and Maintenance	*120*	*30*	*40*	*4*	*0.10*	*0.13*
Circuits and Physics	*50*	*30*	*40*	*8*	*0.20*	*0.26*
Electronics	--	--	--	--	--	--
Engineering Drawing	*120*	--	--	--	--	--
Computer Programing	--	--	--	--	--	--
Computer and Control Systems	--	--	--	--	--	--
Academic	*170* *120*	*30* *150*	*40* *40*	*20* *1*	*0.50* *0.03*	*0.65* *0.04*
Science	--	--	--	--	--	--
Physical Education	--	--	--	--	--	--

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3.) Round off total to next higher whole number.

a. *2* lecture/demonstration areas with a student capacity of *30*, each.
b. *1* lecture/demonstration areas with a student capacity of *150*, each.
c. ______ lecture/demonstration areas with a student capacity of ______, each.
d. ______ lecture/demonstration areas with a student capacity of ______, each.

FORM B

LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Reaction Group-Periods or Modules (5)	Lecture/Demonstration Areas Required (5) ÷ (4) (6)	Adjusted Lecture/Demonstration Areas Required (6) X 1.3 (7)
Electrical Mach. and Power						
Manuf. Processes, Elec. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic						
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3.) Round off total to next higher whole number.

a. ________ lecture/demonstration areas with a student capacity of ________, each.
b. ________ lecture/demonstration areas with a student capacity of ________, each.
c. ________ lecture/demonstration areas with a student capacity of ________, each.
d. ________ lecture/demonstration areas with a student capacity of ________, each.

INSTRUCTIONS FOR COMPLETING FORM C
SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Column 1

Content Area--Content areas are listed in Column 1.

Column 2

Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each content area indicated in Column 7 and 8 of Form A for all occupational preparation programs.

Column 3

Maximum Group Size--Opposite each content area, enter the maximum group size desired for a seminar area to serve the content area (Form A, Column 12).

Column 4

Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5

Total Weekly Interaction Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to interaction learning as indicated in Column 14 of Form A(s) for all occupational preparation programs.

Column 6

Seminar Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7

Adjusted Seminar Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

Column 8

Totals--Since seminar areas, unlike laboratory areas, can be commonly utilized by nearly all content areas, the entries in Column 8 can be added for all seminar areas with identical maximum group sizes or entered in Column 3. For example, 8a might read 2 seminar areas with a student capacity of 20, each.

SAMPLE FORM C

SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Interaction Group-Periods or Modules (5)	Seminar Areas Required (5) ÷ (4) (6)	Adjusted Seminar Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic	*120*	*15*	*40*	*8*	*0.20*	*0.26*
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3). Round up total to next higher whole number.

a. ___*1*___ seminar areas with a minimum student capacity of ___*15*___, each.
b. ______ seminar areas with a minimum student capacity of ______, each.
c. ______ seminar areas with a minimum student capacity of ______, each.
d. ______ seminar areas with a minimum student capacity of ______, each.

FORM C

SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Interaction Group-Periods or Modules (5)	Seminar Areas Required (5) ÷ (4) (6)	Adjusted Seminar Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic						
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3). Round up total to next higher whole number.

a. ________ seminar areas with a minimum student capacity of ________, each.
b. ________ seminar areas with a minimum student capacity of ________, each.
c. ________ seminar areas with a minimum student capacity of ________, each.
d. ________ seminar areas with a minimum student capacity of ________, each.

INSTRUCTIONS FOR COMPLETING FORM D
LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Column 1

Content Area--Content areas are listed in Column 1.

Column 2

Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each area as indicated in Columns 7 and 8 of Form A for all occupational preparation programs.

Column 3

Maximum Group Size--Opposite each content area, enter the maximum group size desired for a laboratory area to serve the content area (Form A, Column 15).

Column 4

Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5

Total Weekly Action Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to action learning as indicated in Column 17 of Form A(s) for all occupational preparation programs.

Column 6

Laboratory Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7

Adjusted Laboratory Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

SAMPLE FORM D

LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Action Group-Periods or Modules (5)	Laboratory Areas Required (5) ÷ (4) (6)	Laboratory Adjusted Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Construction and Maintenance	*120*	*15*	*40*	*24*	*0.60*	*0.78*
Circuits and Physics	*50*	*15*	*40*	*12*	*0.30*	*0.39*
Electronic						
Engineering Drawing	*120*	*30*	*40*	*12*	*0.30*	*0.39*
Computer Programing						
Computer and Controls Systems						
Academic						
Science						
Physical Education						

FORM D

LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Action Group-Periods or Modules (5)	Laboratory Areas Required (5) ÷ (4) (6)	Laboratory Adjusted Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Construction and Maintenance						
Circuits and Physics						
Electronic						
Engineering Drawing						
Computer Programing						
Computer and Controls Systems						
Academic						
Science						
Physical Education						

SAMPLE FORM E

SUMMARY OF FACILITY REQUIREMENTS FOR ELECTRICAL TECHNOLOGY PROGRAMS

Instructional Areas	Number Required*		Required Student Capacity
	Calculated Forms B, C, D Column 7	Next Higher Whole Number	
Lecture/Demonstration	*1.04*	*2.00*	*30*
Lecture/Demonstration			
1 Lecture/Demonstration			
Lecture/Demonstration			
Seminar	*0.26*	*1.00*	*15*
Seminar			
2 Seminar			
Seminar			
Circuits & Physics Laboratory Area(s)	*0.39*	*1.00*	*15*
Electrical Machines and Power Laboratory Area(s)			
Manufacturing Processes, Electrical Constr. & Maintenance Lab. Area(s)			
Circuits & Physics Laboratory Area(s)			
3 Electronics Laboratory Area(s)			
Engineering Drawing Lab. Area(s)			
Computer Programing Lab. Area(s)			
Computer and Control Lab. Area(s)			

4 Multi-purpose areas

If any of the specialized areas entered above are to be combined as multi-purpose areas, indicate the combinations desired.

a. *Circuits and Physics Lab. Area, Electronics Lab. Area & Seminar Area*
b. ____
c. ____
d. ____

5 Summary of facility requirements for electrical technology training program requirements. Based on the above entries, summarize the total quantitative facility requirements for the planned program.____

*Enter the number of instructional areas needed for each student capacity required. In the event that the numbers required indicate that an area will be used only sparingly, consideration should be given to sharing lecture/demonstration and seminar areas with other training programs or the construction of high student capacity areas which are capable of being subdivided for instructional purposes.

FORM E

SUMMARY OF FACILITY REQUIREMENTS FOR ELECTRICAL TECHNOLOGY PROGRAMS

	Instructional Areas	Number Required*		Required Student Capacity
		Calculated Forms B, C, D Column 7	Next Higher Whole Number	
	Lecture/Demonstration			
	Lecture/Demonstration			
1	Lecture/Demonstration			
	Lecture/Demonstration			
	Seminar			
	Seminar			
2	Seminar			
	Seminar			
	Circuits & Physics Laboratory Area(s)			
	Electrical Machines and Power Laboratory Area(s)			
	Manufacturing Processes, Electrical Constr. & Maintenance Lab. Area(s)			
	Circuits & Physics Laboratory Area(s)			
3	Electronics Laboratory Area(s)			
	Engineering Drawing Lab. Area(s)			
	Computer Programing Lab. Area(s)			
	Computer and Control Lab. Area(s)			

4 Multi-purpose areas

If any of the specialized areas entered above are to be combined as multi-purpose areas, indicate the combinations desired.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

5 Summary of facility requirements for electrical technology training program requirements. Based on the above entries, summarize the total quantitative facility requirements for the planned program. ______________________________

____

____

____

*Enter the number of instructional areas needed for each student capacity required. In the event that the numbers required indicate that an area will be used only sparingly, consideration should be given to sharing lecture/demonstration and seminar areas with other training programs or the construction of high student capacity areas which are capable of being subdivided for instructional purposes.

QUALITATIVE FACILITY NEEDS

In this section, detailed information on the kind of instructional areas required is recorded. Special forms are provided for describing the nature of lecture/demonstration areas, laboratory areas, and auxiliary areas to be provided. For each general type of instructional area required information is sought in the following categories.

1. The relationship of the area to other instructional areas (specialized vs. multi-purpose utilization of space).
2. The number of these kinds of areas needed (see previous section or calculations booklet: Special Facility Requirements and Space Needs).
3. The activities of students and teachers in the instructional area.
4. The spatial relationships within the area and the area's spatial relationships to other instructional areas and the building as a whole.
5. The furniture and equipment required for the area.
6. The environmental factors required for the area.
7. The special utility services required for the area.
8. The minimum space requirements required for the area.

FORM F

DESCRIPTION OF LECTURE/DEMONSTRATION AREA(S) TO BE USED PRINCIPALLY FOR GROUP REACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The lecture/demonstration area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with ____________ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. As an area within a single multi-use space	Yes	No

2. Number of lecture/demonstration areas required for the desired program reagrdless of capacity (see Form E) ____________

3. Student and instructor activities in this space. Indicate the extent to which each of the activities listed below will occur.

a. Listening to lectures	1	2	3	N
b. Observing demonstrations	1	2	3	N
c. Taking notes	1	2	3	N
d. Viewing films, slides, overhead projections, etc.	1	2	3	N
e. ________________________________	1	2	3	N
f. ________________________________	1	2	3	N

4. Spatial relationships. Indicate the extent to which the lecture/demonstration area(s) should be accessible to the:

a. Instructional materials center	1	2	3	N
b. Building entrance	1	2	3	N
c. Delivery area	1	2	3	N
d. Other instructional areas				
1) ____________________________	1	2	3	N
2) ____________________________	1	2	3	N
3) ____________________________	1	2	3	N
e. Other building areas				
1) ____________________________	1	2	3	N
2) ____________________________	1	2	3	N
3) ____________________________	1	2	3	N

5. Furniture and equipment

   a. Student seating

FORM F

1) Individual desks and chairs	P A NA*
a) Number of desks and chairs required	____________
b) Provision for storage	Yes No
2) Permanent-type desk	P A NA
a) Number required	____________
b) Provision for storage	Yes No
3) Desk and chair combination	P A NA
a) Number required	____________
b) Provision for storage	Yes No
4) Tables and chairs	P A NA
a) Number of tables required	____________
b) Number of chairs required	____________
c) Provision for storage	Yes No
5) Auditorium-type seating	P A NA
Number of seats required	____________
b. Stage	Yes No
1) Permanent type	P A NA
2) Portable type	P A NA
The approximate area in square feet desired	____________
c. Sound amplifying system	P A NA
d. Controls for regulating light intensity	P A NA
e. Lectern	
1) Permanent type	P A NA
2) Portable type	P A NA
3) Provision for storage	Yes No
f. Projection screen	
1) Built-in type	P A NA
2) Portable type	P A NA
3) Approximate dimensions	____________
4) Provision for storage	Yes No

g. Other equipment required for lecture/demonstration area(s) are:

1) ______________________________

2) ______________________________

3) ______________________________

4) ______________________________

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the lecture/demonstration area(s).

____

____

____

____

---

*Code: P = Preferred; A = Acceptable; NA = Not Acceptable. This scale is used frequently on the following pages.

FORM F

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the lecture/demonstration area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the lecture/demonstration area(s).

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound systems. Indicate any special consideration important to the planning of the lecture/demonstration area(s).

e. Safety. In planning a school building, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the lecture/demonstration area(s).

7. Vertical instructional surfaces

a. Chalkboard	Yes		No
1) Wall-mounted	P	A	NA
Number of lineal feet	______		
2) Portable	P	A	NA
Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet	______		
c. Pegboard	Yes		No
Number of lineal feet	______		

8. Special utility services required

a. Electricity		
1) Projection equipment	Yes	No
2) Sound amplifying equipment	Yes	No

FORM F

3) Electrical needs for other equipment (specify)
   a) ______________________________
   b) ______________________________
   c) ______________________________
   d) ______________________________

b. Other utility needs for the lecture/demonstration area
   1) ______________________________
   2) ______________________________
   3) ______________________________
   4) ______________________________

9. The minimum space requirement in square feet for each lecture/demonstration area (optional) ___________. (The planner should be aware of any state or local regulation or recommendations concerning floor space requirements.)

10. Other important factors to be considered in the planning of the lecture/demonstration area(s) are:

FORM G

DESCRIPTION OF SEMINAR AREA(S) TO BE USED PRINCIPALLY FOR GROUP INTERACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The seminar area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with ___________ laboratory area(s)	Yes	No
c. In combination with lecture/demonstration area(s)	Yes	No
d. As an area within a single multi-use space	Yes	No

2. The number of seminar area(s) required for the desired program regardless of capacity (see Form E) ___________

3. Student and instructor activities in this space. Indicate the extent to which each of the activities listed below will occur.

a. Small group discussing	1	2	3	N
b. Viewing films, slides, overhead projections, etc.	1	2	3	N
c. Demonstrating	1	2	3	N
d. Reporting	1	2	3	N
e. Working on projects	1	2	3	N
f. ___________________________	1	2	3	N
g. ___________________________	1	2	3	N

4. Spatial relationships. Indicate the extent to which the seminar area(s) should be accessible to the:

a. Instructional materials center	1	2	3	N
b. Building entrance	1	2	3	N
c. Delivery area	1	2	3	N
d. Other instructional areas				
1) ___________________________	1	2	3	N
2) ___________________________	1	2	3	N
3) ___________________________	1	2	3	N
e. Other building areas				
1) ___________________________	1	2	3	N
2) ___________________________	1	2	3	N
3) ___________________________	1	2	3	N

5. Furniture and equipment

a. Seminar table	Yes	No
1) Number required	___________	

2) Seating for how many persons ____________
3) Permanent type P A NA
4) Portable type P A NA
5) Provision for storage Yes No

b. Chairs Yes No
1) Number required ____________
2) Straight-back type P A NA
3) Folding type P A NA
4) Provision for storage Yes No

c. Other equipment required for seminar area(s):
1) ________________________________
2) ________________________________
3) ________________________________

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of seminar areas.

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b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the seminar area(s).

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c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the seminar area(s).

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d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the seminar area(s).

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e. Safety. In planning a school building, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the seminar area(s).

G

FORM G

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7. Vertical instructional surfaces

a. Chalkboard	Yes		No
1) Wall-mounted	P	A	NA
Number of lineal feet	__________		
2) Portable	P	A	NA
a) Number of lineal feet	__________		
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet	__________		
c. Pegboard	Yes		No
Number of lineal feet	__________		

8. Special utility services required

a. Electricity		
1) Projection equipment	Yes	No
2) Sound amplifying equipment	Yes	No
3) Instructional TV outlets	Yes	No
4) Electrical needs for other equipment (specify)		

____

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____

b. Other utility needs for the seminar area(s)

1) __________________________

2) __________________________

3) __________________________

4) __________________________

9. Minimum space requirement in square feet for each area (optional) __________. (The planner should be aware of any state or local regulations or recommendations concerning floor space requirements.)

10. Other important factors to be considered in the planning of the seminar area(s) are:

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FORM H

DESCRIPTION OF ELECTRICAL MACHINES AND POWER LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The electrical machines and power laboratory area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with ________ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) ________

3. Student and instructor activities in various space divisions within the electrical machines and power laboratory area(s). Indicate the extent to which each activity will occur.

a. Lecture/demonstration space				
1) Discussing laboratory procedure	1	2	3	N
2) Use of visual instructional aids	1	2	3	N
3) Computation and report writing	1	2	3	N
4) ________	1	2	3	N
b. Power distribution panel space				
1) Providing power required for experiments	1	2	3	N
2) Providing interconnections to other lab stations	1	2	3	N
3) Providing special power requirements to other laboratories	1	2	3	N
4) ________	1	2	3	N
c. Motor-generator and test bench area				
1) Conducting electrical machines experiments	1	2	3	N
2) Conducting motor control experiments	1	2	3	N
3) Conducting solid-state energy conversion experiments	1	2	3	N
4) ________	1	2	3	N
d. Control equipment space				
1) Conducting magnetic control experiments	1	2	3	N
2) Conducting electronic control experiments	1	2	3	N
3) Conducting fluidic control experiments	1	2	3	N
4) ________	1	2	3	N
e. Demonstration equipment storage space				
1) Specialized equipment for demonstration	1	2	3	N

FORM H

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2) ______________________	1 2 3 N
f. Instrument storage space	
1) Small portable instrument storage	1 2 3 N
2) Cart or caster mounted instrument storage	1 2 3 N
3) ______________________	1 2 3 N
g. Apparatus storage space	
1) Small portable apparatus storage	1 2 3 N
2) Cart or caster mounted apparatus storage	1 2 3 N
3) ______________________	1 2 3 N
h. Reference material space	
1) Instructional material storage	1 2 3 N
2) Manufacturers' diagrams storage	1 2 3 N
3) Equipment manuals storage	1 2 3 N
4) Periodical storage	1 2 3 N
5) Reading table space	1 2 3 N
6) ______________________	1 2 3 N
i. Office space	
1) Directing laboratory activities	1 2 3 N
2) Consultation	1 2 3 N
3) ______________________	1 2 3 N
j. Other space(s) (specify) __________ ______________________	1 2 3 N
1) ______________________	1 2 3 N
2) ______________________	1 2 3 N
3) ______________________	1 2 3 N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

a. Within the electrical machines and power laboratory area(s)	
1) Lecture/demonstration space to:	
a) Power distribution panel space	1 2 3 N
b) Motor-generator and test bench space	1 2 3 N
c) Control equipment space	1 2 3 N
d) Demonstration equipment storage space	1 2 3 N
e) Instrument storage space	1 2 3 N
f) Apparatus storage space	1 2 3 N
g) Reference material space	1 2 3 N
h) Office space	1 2 3 N
i) Other	1 2 3 N
2) Power distribution panel space to:	
a) Motor-generator and test bench space	1 2 3 N
b) Control equipment space	1 2 3 N
c) Demonstration equipment storage space	1 2 3 N

FORM H

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

d) Instrument storage space 1 2 3 N
e) Apparatus storage space 1 2 3 N
f) Reference material space 1 2 3 N
g) Office space 1 2 3 N
h) Other 1 2 3 N
3) Motor-generator and test bench space to:
a) Control equipment space 1 2 3 N
b) Demonstration equipment storage space 1 2 3 N
c) Instrument storage space 1 2 3 N
d) Apparatus storage space 1 2 3 N
e) Reference material space 1 2 3 N
f) Office space 1 2 3 N
g) Other 1 2 3 N
4) Control equipment space to:
a) Demonstration equipment storage space 1 2 3 N
b) Instrument storage space 1 2 3 N
c) Apparatus storage space 1 2 3 N
d) Reference material space 1 2 3 N
e) Office space 1 2 3 N
f) Other 1 2 3 N
5) Demonstration equipment storage space to:
a) Instrument storage space 1 2 3 N
b) Apparatus storage space 1 2 3 N
c) Reference material space 1 2 3 N
d) Office space 1 2 3 N
e) Other 1 2 3 N
6) Instrument storage space to:
a) Apparatus storage space 1 2 3 N
b) Reference material space 1 2 3 N
c) Office space 1 2 3 N
d) Other 1 2 3 N
7) Apparatus storage space to:
a) Reference material space 1 2 3 N
b) Office space 1 2 3 N
c) Other 1 2 3 N
8) Reference material space to:
a) Office space 1 2 3 N
b) Other 1 2 3 N
9) Office space to:
Other 1 2 3 N
b. Electrical machines and power laboratory area(s) to:
1) Instructional materials center 1 2 3 N
2) Offices 1 2 3 N
3) Building entrance 1 2 3 N
4) Other instructional areas

FORM H

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

5) Other building areas (specify)	
a) ______________________	1 2 3 N
b) ______________________	1 2 3 N
5. Furniture and equipment	
a. Power distribution panel	Yes No
1) Three phase AC subpanel(s)	Yes No
a) Number required	________
b) Input feeder required	Yes No
2) Single phase AC subpanel(s)	Yes No
a) Number required	________
b) Input feeder required	Yes No
3) Direct-current subpanel(s)	Yes No
Number required	________
4) Jacks for interconnection of lab stations	Yes No
Number required	________
5) Connections to other laboratories	Yes No
Number required	________
6) Others (specify) ______________	Yes No
b. High current DC source	Yes No
1) Motor-generator set	Yes No
a) Number required	________
b) Rating	________
2) Solid state rectifiers	Yes No
a) Number required	________
b) Rating	________
3) Others (specify) ______________	Yes No
c. Transformers	Yes No
1) Three phase transformers	Yes No
a) Number required	________
b) Rating	________
2) Single phase transformers	Yes No
a) Number required	________
b) Rating	________
3) Inverter transformers	Yes No
a) Number required	________
b) Rating	________
4) Others (specify) ______________	Yes No
d. Motor-generator sets	Yes No
1) DC-DC	Yes No
a) Number required	________
b) Rating	________
2) AC-DC	Yes No
a) Number required	________
b) Rating	________
3) DC-AC	Yes No
a) Number required	________

FORM H

b) Rating	________
4) Universal	Yes No
a) Number required	________
b) Rating	________
5) Others (specify) ________________	Yes No
e. Motor-generator test stands	Yes No
1) Number required	________
2) Size	________
3) Type of construction	________
4) Portable or stationary	________
5) Others (specify) ________________	Yes No
f. Rectifiers for experiments	Yes No
1) Mounted silicon power diodes	Yes No
a) Number required	________
b) Rating	________
2) Mounted power thyristors	Yes No
a) Number required	________
b) Rating	________
3) Others (specify) ________________	Yes No
g. Magnetic controllers	Yes No
1) Small portable units	Yes No
a) Number required	________
b) Rating	________
2) Cart or caster mounted units	Yes No
a) Number required	________
b) Rating	________
3) Others (specify) ________________	Yes No
h. Electronic controllers	Yes No
1) Small portable units	Yes No
a) Number required	________
b) Rating	________
2) Cart or caster mounted units	Yes No
a) Number required	________
b) Rating	________
3) Others (specify) ________________	Yes No
i. Fluidic controllers	Yes No
1) Small portable units	Yes No
a) Number required	________
b) Rating	________
2) Cart or caster mounted units	Yes No
a) Number required	________
b) Rating	________
3) Others (specify) ________________	Yes No
j. Special demonstration units	Yes No
1) Number required	________
2) Specify type ________________	Yes No
k. Components for experiments	Yes No
1) Loadbanks or similar device	Yes No
a) Number required	________
b) Rating	________
2) Inductors	Yes No
a) Number required	________
b) Rating	________
3) Capacitors	Yes No

FORM H

a) Number required ____________
b) Rating ____________
4) Rheostats or potentiometers Yes No
a) Number required ____________
b) Rating ____________
5) Autotransformers Yes No
a) Number required ____________
b) Rating ____________
6) Switches Yes No
a) Number required ____________
b) Rating ____________
7) Relays Yes No
a) Number required ____________
b) Rating ____________
8) Timers Yes No
a) Number required ____________
b) Rating ____________
9) Synchros Yes No
a) Number required ____________
b) Rating ____________
10) Interconnection leads Yes No
a) Number required ____________
b) Rating ____________
11) Others (specify) ______________________
1. Instruments Yes No
1) Oscilloscope(s) Yes No
a) Number required ____________
b) Specifications ____________
2) Electronic counter(s) Yes No
a) Number required ____________
b) Specifications ____________
3) Tachometer(s) Yes No
a) Number required ____________
b) Specifications ____________
4) Wattmeter(s) Yes No
a) Number required ____________
b) Rating ____________
5) Voltmeter(s) Yes No
a) Number required ____________
b) Rating ____________
6) Ammeter(s) Yes No
a) Number required ____________
b) Rating ____________
7) Power factor meter(s) Yes No
a) Number required ____________
b) Rating ____________
8) Phase sequence indicator(s) Yes No
a) Number required ____________
b) Specifications ____________
9) Instrument transformer(s) Yes No
a) Number required ____________
b) Specifications ____________
10) Bridge(s) Yes No
a) Number required ____________
b) Specifications ____________

FORM H

11) Volt-Ohm-Meter(s) Yes No
  a) Number required
  b) Rating
12) Thyristor checker(s) Yes No
  a) Number required
  b) Specifications
13) Others (specify)__________________ Yes No

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical machines and power laboratory area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity and ventilation. Indicate any special considerations important to the planning of the electrical machines and power laboratory area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electrical machines and power laboratory area(s).

d. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any safety considerations which have implications of the electrical machines and power laboratory area(s).

7. Vertical instructional surfaces

a. Chalkboard Yes No
  1) Wall-mounted P A NA
    Number of lineal feet
  2) Portable P A NA
    a) Number of lineal feet
    b) Provision for storage Yes No

FORM H

b. Tack board Yes No
    Number of lineal feet ____
c. Pegboard Yes No
    Number of lineal feet ____
d. Projection screen Yes No
    Size ____

8. Special utility services required

a. Electricity
    1) Power distribution panel Yes No
        a) 208/120 volt ac Yes No
        b) 240/120 volt ac Yes No
    2) Special lighting requirements (specify)
        a) ____
        b) ____
        c) ____
        d) ____
    3) Electrical needs for other equipment (specify)
        a) ____
        b) ____
        c) ____
        d) ____
    4) Special wiring requirements
        a) Instructional TV Yes No
        b) Intercom Yes No
        c) Other (specify) ____ Yes No
        ____
b. Water
    1) Drinking fountain(s) Yes No
    2) Sinks Yes No
    3) Toilets Yes No
    4) Other (specify) ____ Yes No
    ____

9. Minimum space requirements in square feet

a. Floor area in square feet for entire electrical machines and power laboratory area ____
b. If distinct space divisions are desired according to function, give minimal floor area requirements in square feet for each of the following areas if included in the desired program:
    1) Lecture/demonstration area ____
    2) Power distribution area ____
    3) Motor-generator and test bench ____
    4) Control equipment ____
    5) Special demonstration equipment ____
    6) Instrument storage ____
    7) Apparatus storage ____
    8) Reference material ____

FORM H

9) Office ____________
10) Other (specify) ____________________ ____________

10. Other important factors to be considered in the planning of the electrical machines and power laboratory area(s) are:

FORM I

DESCRIPTION OF MANUFACTURING PROCESSES AND ELECTRICAL CONSTRUCTION AND MAINTENANCE AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The manufacturing processes and electrical construction and maintenance area(s) should be planned:

a.	As independent unit(s)	Yes	No
b.	In combination with ______ laboratory area(s) (specify)	Yes	No
c.	In combination with seminar area(s)	Yes	No
d.	In combination with lecture/demonstration area(s)	Yes	No
e.	As an area within a single multi-use area(s)	Yes	No

2. Student capacity required for scheduled activities (see Form E) ____________

3. Student and instructor activities in various space division within the manufacturing processes and electrical construction and maintenance area(s) indicate the extent to which each activity will occur.

a.	Lecture/demonstration area				
	1) Lecture purposes	1	2	3	N
	2) Demonstration purposes	1	2	3	N
	3) Others (specify) ____________________	1	2	3	N
b.	Reference area				
	1) Student referencing	1	2	3	N
	2) Storage of reference materials	1	2	3	N
	3) Planning table	1	2	3	N
	4) Study space	1	2	3	N
	5) Others (specify)	1	2	3	N
c.	Display area				
	1) Project display	1	2	3	N
	2) Product display	1	2	3	N
	3) Bulletin board display	1	2	3	N
	4) Storage of display materials	1	2	3	N
	5) Others (specify) ____________________	1	2	3	N
d.	Clean-up area				
	1) Student washing	1	2	3	N
	2) Parts cleaning	1	2	3	N
	3) Others (specify) ____________________	1	2	3	N
e.	Storage area				
	1) Raw material storage	1	2	3	N
	2) Parts and supply storage	1	2	3	N
	3) Student project storage	1	2	3	N

FORM I

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

- 4) Others (specify) ________________ 1 2 3 N

f. Tool board area
- 1) Storage of tools 1 2 3 N
- 2) Others (specify) ________________ 1 2 3 N

g. Welding area
- 1) Student work station practicing 1 2 3 N
- 2) Instructor demonstration 1 2 3 N
- 3) Project and material storage 1 2 3 N
- 4) Others (specify) ________________ 1 2 3 N

h. Practice wiring area
- 1) Student practice 1 2 3 N
- 2) Instructor demonstration 1 2 3 N
- 3) Cable dispensing 1 2 3 N
- 4) Scrap cable storage 1 2 3 N
- 5) Others (specify) ________________ 1 2 3 N

i. Bench and assembly area
- 1) Student operations 1 2 3 N
- 2) Instructor operations 1 2 3 N
- 3) Others (specify) ________________ 1 2 3 N

j. Machining area(s)
- 1) Turning 1 2 3 N
- 2) Knurling 1 2 3 N
- 3) Threading 1 2 3 N
- 4) Boring 1 2 3 N
- 5) Grinding 1 2 3 N
- 6) Drilling 1 2 3 N
- 7) Reaming 1 2 3 N
- 8) Taper turning 1 2 3 N
- 9) Counter sinking 1 2 3 N
- 10) Counter boring 1 2 3 N
- 11) End milling 1 2 3 N
- 12) Band sawing 1 2 3 N
- 13) Hack sawing 1 2 3 N
- 14) Pipe threading 1 2 3 N
- 15) Fly cutting 1 2 3 N
- 16) Buffing 1 2 3 N
- 17) Polishing 1 2 3 N
- 18) Others (specify) ________________ 1 2 3 N

k. Measurement area
- 1) Verniers 1 2 3 N
- 2) Optical 1 2 3 N
- 3) Others (specify) ________________ 1 2 3 N

l. Special operations area
- 1) Printed circuit 1 2 3 N
- 2) Micro-electronics 1 2 3 N
- 3) Others (specify) ________________ 1 2 3 N

m. Support area(s)
- 1) Air 1 2 3 N
- 2) Water 1 2 3 N

FORM I

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

3) Sewer 1 2 3 N
4) Exhaust 1 2 3 N
5) Others (specify) ________________ 1 2 3 N

4. Spatial relationships indicate the extent to which spaces should be accessible to each other.

Within the manufacturing processes and electrical construction and maintenance area(s)

1) Lecture/demonstration space to:
    - a) Reference space 1 2 3 N
    - b) Display space 1 2 3 N
    - c) Clean-up space 1 2 3 N
    - d) Storage space 1 2 3 N
    - e) Tool board space 1 2 3 N
    - f) Welding space 1 2 3 N
    - g) Practice wiring space 1 2 3 N
    - h) Bench and assembly space 1 2 3 N
    - i) Machining space 1 2 3 N
    - j) Measurement space 1 2 3 N
    - k) Special operations space 1 2 3 N
    - l) Support space 1 2 3 N
2) Reference space to:
    - a) Display space 1 2 3 N
    - b) Clean-up space 1 2 3 N
    - c) Storage space 1 2 3 N
    - d) Tool board space 1 2 3 N
    - e) Welding space 1 2 3 N
    - f) Practice wiring space 1 2 3 N
    - g) Bench and assembly space 1 2 3 N
    - h) Machining space 1 2 3 N
    - i) Measurement space 1 2 3 N
    - j) Special operation space 1 2 3 N
    - k) Support space 1 2 3 N
3) Display space to:
    - a) Clean-up space 1 2 3 N
    - b) Storage space 1 2 3 N
    - c) Tool board space 1 2 3 N
    - d) Welding space 1 2 3 N
    - e) Practice wiring space 1 2 3 N
    - f) Bench and assembly space 1 2 3 N
    - g) Machining space 1 2 3 N
    - h) Measurement space 1 2 3 N
    - i) Special operations space 1 2 3 N
    - j) Support space 1 2 3 N
4) Clean-up space to:
    - a) Storage space 1 2 3 N
    - b) Tool board space 1 2 3 N

FORM I

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

	c) Welding space	1	2	3	N
	d) Practice wiring space	1	2	3	N
	e) Bench and assembly space	1	2	3	N
	f) Machining space	1	2	3	N
	g) Measurement space	1	2	3	N
	h) Special operations space	1	2	3	N
	i) Support space	1	2	3	N
5)	Storage space to:				
	a) Tool board space	1	2	3	N
	b) Welding space	1	2	3	N
	c) Practice wiring space	1	2	3	N
	d) Bench and assembly space	1	2	3	N
	e) Machining space	1	2	3	N
	f) Measurement space	1	2	3	N
	g) Special operations space	1	2	3	N
	h) Support space	1	2	3	N
6)	Tool board space to:				
	a) Welding space	1	2	3	N
	b) Practice wiring space	1	2	3	N
	c) Bench and assembly space	1	2	3	N
	d) Machining space	1	2	3	N
	e) Measurement space	1	2	3	N
	f) Special operations space	1	2	3	N
	g) Support space	1	2	3	N
7)	Welding space to:				
	a) Practice wiring space	1	2	3	N
	b) Bench and assembly space	1	2	3	N
	c) Machining space	1	2	3	N
	d) Measurement space	1	2	3	N
	e) Special operations space	1	2	3	N
	f) Support space	1	2	3	N
8)	Practice wiring space to:				
	a) Bench and assembly space	1	2	3	N
	b) Machining space	1	2	3	N
	c) Measurement space	1	2	3	N
	d) Special operations space	1	2	3	N
	e) Support space	1	2	3	N
9)	Bench and assembly space to:				
	a) Machining space	1	2	3	N
	b) Measurement space	1	2	3	N
	c) Special operations space	1	2	3	N
	d) Support space	1	2	3	N
10)	Machining space to:				
	a) Measurement space	1	2	3	N
	b) Special operations space	1	2	3	N
	c) Support space	1	2	3	N
11)	Measurement space to:				
	a) Special operations space	1	2	3	N
	b) Support space	1	2	3	N
12)	Special operations space to:				
	Support space	1	2	3	N

FORM I

5. Equipment

a. Lathe — Yes No
  1) Number required ____________
  2) Description ____________
b. Vertical end mill — Yes No
  1) Number required ____________
  2) Description ____________
c. Phantograph engraving machine — Yes No
  1) Number required ____________
  2) Description ____________
d. Drill press — Yes No
  1) Number required ____________
  2) Description ____________
e. Metal cutting band saw — Yes No
  1) Number required ____________
  2) Description ____________
f. Pedestal grinder — Yes No
  1) Number required ____________
  2) Description ____________
g. AC welder — Yes No
  1) Number required ____________
  2) Description ____________
h. DC welder — Yes No
  1) Number required ____________
  2) Description ____________
i. Oxy-acetylene equipment — Yes No
  1) Number required ____________
  2) Description ____________
j. Wet-dry sander — Yes No
  1) Number required ____________
  2) Description ____________
k. Power hack saw — Yes No
  1) Number required ____________
  2) Description ____________
l. Arbor press — Yes No
  1) Number required ____________
  2) Description ____________
m. Degreasing parts tank — Yes No
  1) Number required ____________
  2) Description ____________
n. Benches — Yes No
  1) Number required ____________
  2) Description ____________
o. Vices — Yes No
  1) Number required ____________
  2) Description ____________
p. Lecture table — Yes No
  1) Number required ____________
  2) Description ____________
q. Chairs — Yes No
  1) Number required ____________
  2) Description ____________
r. Sink — Yes No
  1) Number required ____________

2) Description

s. Reference material cabinet — Yes No
1) Number required ____
2) Description

t. Tool board — Yes No
1) Number required ____
2) Description

u. Storage cabinets — Yes No
1) Number required ____
2) Description

v. Screw-bolt-nut cabinet — Yes No
1) Number required ____
2) Description

w. Raw material storage rack — Yes No
1) Number required ____
2) Description

x. Air compressor — Yes No
1) Number required ____
2) Description

y. Instructor's desk — Yes No
1) Number required ____
2) Description

z. Measurement cabinet — Yes No
1) Number required ____
2) Description

aa. Special operations equipment — Yes No
1) Number required ____
2) Description

bb. Test equipment — Yes No
1) Number required ____
2) Description ____

6. Environmental factors

a. Aesthetic. Factors to be considered in the asethetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical construction and maintenance and manufacturing processes area(s).

____

____

____

____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electrical construction and maintenance and manufacturing processes area(s).

____

____

____

____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which sould be taken into account in planning the visual environment of the electrical construction and maintenance and manufacturing processes area(s).

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electrical construction and maintenance and manufacturing processes laboratory.

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special considerations which have implications for design of the electrical construction and maintenance and manufacturing processes area(s).

7. Vertical instructional surfaces

a. Chalkboard	Yes		No
1) Wall-mounted	P	A	NA
Number of lineal feet			
2) Portable	P	A	NA
a) Number of lineal feet			
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet			
c. Pegboard	Yes		No
Number of lineal feet			

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire electrical construction and maintenance and manufacturing processes area

b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program
   1) Storage space
      a) Raw material storage space
      b) Screw-bolt-nut storage space

c) Reference material storage space ____________
d) Project storage space ____________
e) Display storage space ____________
2) Lecture and demonstration space ____________
3) Clean-up space ____________
4) Tool board space ____________
5) Welding space ____________
6) Practice wiring space ____________
7) Bench and assembly space ____________
8) Machining space ____________
9) Measurement space ____________
10) Practice wiring space ____________
11) Special operations space ____________
12) Support space ____________
13 13) Other (specify) ____________________

9. Other important factors to be considered in the planning of the electrical construction and maintenance and manufacturing processes are:

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FORM J

DESCRIPTION OF CIRCUITS AND PHYSICS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The circuits and physics laboratory area(s) should be planned:
   - a. As independent unit — Yes No
   - b. In comibnation with ________ laboratory area(s) (specify) — Yes No
   - c. In combination with seminar area(s) — Yes No
   - d. In combination with lecture/demonstration area(s) — Yes No
   - e. As an area within a single multi-use space — Yes No

2. Student capacity required for scheduled activities (see Form E) ________

3. Student and instructor activities in various space divisions within the circuits and physics area(s). Indicate the extent to which each activity will occur.
   - a. Experimental station space
     - 1) Study of basic instrumentation and measuring techniques — 1 2 3 N
     - 2) Performance of experiments involving fundamental DC circuits — 1 2 3 N
     - 3) Performance of experiments involving fundamental AC circuits — 1 2 3 N
     - 4) Performing of experiments using three-phase power — 1 2 3 N
     - 5) Other (specify) ________ ________
   - b. Power control space
     - 1) Distributing and controlling DC power to individual experimental stations — 1 2 3 N
     - 2) Distributing and controlling AC power to individual experimental stations — 1 2 3 N
     - 3) Distributing and controlling three-phase power to individual experimental stations — 1 2 3 N
     - 4) Other (specify) ________ ________
   - c. Instrument storage sapce
     - 1) Testing and calibrating equipment — 1 2 3 N
     - 2) Repairing equipment — 1 2 3 N
     - 3) Preparing (building or dismantling) demonstration equipment — 1 2 3 N
     - 4) Checking equipment in and out — 1 2 3 N
     - 5) Other (specify) ________ ________
   - d. Lecture/demonstration space
     - 1) Discussing experimental projects — 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2) Discussing report writing techniques 1 2 3 N
3) Demonstrating with specialized equipment 1 2 3 N
4) Other (specify) ____________________
____

e. Classroom space
1) Preparing diagrams, data sheets and procedures prior to experimentation 1 2 3 N
2) Computing and graphing data and/or results 1 2 3 N
3) Compiling reports 1 2 3 N
4) Using research materials (books, periodicals, slides, etc.) 1 2 3 N
5) Other (specify) ____________________
____

f. Other activities in the circuits and physics laboratory area(s) or related areas
1) ____________________ 1 2 3 N
2) ____________________ 1 2 3 N
3) ____________________ 1 2 3 N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the experimental station space
1) Experimental station space to:
   a) Power control space 1 2 3 N
   b) Equipment storage space 1 2 3 N
   c) Lecture/demonstration space 1 2 3 N
   d) Classroom space 1 2 3 N
   e) Other (specify) ______________ 1 2 3 N
2) Power control space to:
   a) Equipment storage space 1 2 3 N
   b) Lecture/demonstration space 1 2 3 N
   c) Classroom space 1 2 3 N
   d) Other (specify) ______________ 1 2 3 N
3) Equipment storage space to:
   a) Lecture/demonstration space 1 2 3 N
   b) Classroom space 1 2 3 N
   c) Other (specify) ______________ 1 2 3 N
4) Lecture/demonstration space to:
   a) Classroom space 1 2 3 N
   b) Other (specify) ______________ 1 2 3 N
5) Classroom space to:
   Other (specify) ______________ 1 2 3 N

5. Furniture and equipment

a. Experimental benches Yes No
1) Number required ____________
2) Provision for storage required Yes No
3) Power outlets Yes No
   a) Voltages available ____________

b) Number of outlets	__________
c) Type of outlets	__________
4) Circuit breakers	Yes No
a) Type (range)	__________
b) Number required	__________
b. Main power panel	Yes No
1) Direct current	Yes No
a) Range	__________
b) Variable	Yes No
2) Alternating current	Yes No
a) Range (amplitude)	__________
b) Variable (amplitude)	Yes No
c) Range (frequency)	__________
d) Variable (frequency)	Yes No
3) Three-phase	Yes No
Specify variables	__________
4) Special demonstration equipment (specify) __________ __________	Yes No
5) Other (specify) __________ __________	Yes No
c. Portable DC power supplies	Yes No
1) Number required	__________
2) Specifications	__________
d. Portable AC power supplies	Yes No
1) Number required	__________
2) Specifications	__________
e. Oscilloscopes	Yes No
1) Number required	__________
2) Specifications	__________
f. Pulse generators	Yes No
1) Number required	__________
2) Specifications	__________
g. Instructor's desk(s)	Yes No
1) Number required	__________
2) Provision for storage required	Yes No
3) Further description __________ __________	
h. File cabinets	Yes No
1) Number of file drawers required	__________
2) Legal size	P A NA
3) Letter size	P A NA
4) Further description __________ __________	
i. Student chairs	Yes No
1) Number required	__________
2) Folding-type	P A NA
3) Provision for storage	Yes No
4) Further description __________ __________	
j. Student tables	Yes No
1) Number required	__________
2) Folding-type	P A NA
3) Provision for storage	Yes No

4) Further description ______________

____

k. Portable measuring equipment	Yes	No
1) DC voltmeters	Yes	No
a) Number required	______	
b) Type	______	
2) DC ammeters	Yes	No
a) Number required	______	
b) Type	______	
3) AC voltmeters	Yes	No
a) Number required	______	
b) Type	______	
4) AC ammeters	Yes	No
a) Number required	______	
b) Type	______	
5) Multi-purpose meters	Yes	No
a) Number required	______	
b) Type	______	
6) Wattmeters	Yes	No
a) Number required	______	
b) Type	______	
7) Timing devices	Yes	No
a) Number required	______	
b) Type	______	
8) Other (specify) ______________ ______________	Yes	No
l. Circuit components	Yes	No
1) Resistors (fixed)	Yes	No
a) Number required	______	
b) Type	______	
2) Resistors (variable)	Yes	No
a) Number required	______	
b) Type	______	
3) Capacitors	Yes	No
a) Number required	______	
b) Type	______	
4) Inductors	Yes	No
a) Number required	______	
b) Type	______	
5) Other (specify) ______________ ______________ ______________ ______________		

m. Other major equipment needs for the circuits and physics laboratory area(s)

____

____

____

____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are color, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the circuits and physics laboratory area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the circuits and physics laboratory area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the physics and circuits laboratory area(s).

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the circuits and physics laboratory area(s).

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the circuits and physics laboratory area(s).

7. Vertical instructional surfaces

a. Chalkboard	Yes		No
1) Wall-mounted	P	A	NA
Number of lineal feet			
2) Portable	P	A	NA
a) Number of lineal feet			
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet			
c. Pegboard	Yes		No
Number of lineal feet			

FORM J

8. Minimum floor areas required in square feet

   a. Floor area in square feet for the entire circuits and physics laboratory area(s) ____________

   b. If distinct space divisions are desired according to function, give minimum floor area requirement in square feet for each of the following areas, if included in the desired program.

      1) Experimental station space ____________
      2) Power control space ____________
      3) Instrument storage space ____________
      4) Lecture/demonstration space ____________
      5) Classroom space ____________
      6) Other (specify) ______________________ ____________

9. Other important factors to be considered in the planning of the circuits and physics laboratory area(s) are:

FORM K

DESCRIPTION OF ELECTRONICS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The electronics laboratory area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with ________ laboratory area(s) (specify)	Yes	No
c. In combination with lecture/demonstration areas	Yes	No
d. In combination with seminar area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) __________

3. Student and instructor activities in various space(s) within the electronics laboratory area(s). Indicate the extent to which each activity will occur.

a. Lecture/demonstration space				
1) Discussing laboratory procedure	1	2	3	N
2) Use of visual instructional aids	1	2	3	N
3) Computation and report writing	1	2	3	N
4) Instrumentation indoctrination	1	2	3	N
5) Other (specify) ________________	1	2	3	N
b. General test bench area(s)				
1) Conducting electronics experiments	1	2	3	N
2) Conducting calibration exercises	1	2	3	N
3) Equipment familiarization work	1	2	3	N
4) Breadboarding new circuits	1	2	3	N
5) Troubleshooting exercises	1	2	3	N
6) Other (specify) ________________	1	2	3	N
c. Printed circuit area(s)				
1) Drafting printed circuits	1	2	3	N
2) Transfer to printed circuit board	1	2	3	N
3) Etching printed circuits	1	2	3	N
4) Soldering printed circuit boards	1	2	3	N
5) Testing printed circuit boards	1	2	3	N
6) Other (specify) ________________	1	2	3	N
d. Demonstration equipment storage space				
1) General purpose equipment	1	2	3	N
2) Special demonstration equipment	1	2	3	N
3) Closed circuit TV equipment	1	2	3	N
4) Projection equipment	1	2	3	N
5) Sound (record, tape) equipment	1	2	3	N
6) Other (specify) ________________	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

e. Instrument storage space
  1) Small portable instruments 1 2 3 N
  2) Cart-mounted instruments 1 2 3 N
  3) Permanently mounted instrument 1 2 3 N
  4) Other (specify) ____________________ 1 2 3 N

f. Apparatus storage space
  1) Small portable apparatus 1 2 3 N
  2) Cart-mounted apparatus 1 2 3 N
  3) Permanently mounted apparatus 1 2 3 N
  4) Other (specify) ____________________ 1 2 3 N

g. Reference material space
  1) Instructional material storage 1 2 3 N
  2) Manufacturers' diagrams (instruction manuals) storage 1 2 3 N
  3) Other pertinent diagrams 1 2 3 N
  4) Periodical storage 1 2 3 N
  5) Books or texts 1 2 3 N
  6) Reading table space 1 2 3 N
  7) Other (specify) ____________________ 1 2 3 N

h. Office space
  1) Lesson preparation 1 2 3 N
  2) Grading student work 1 2 3 N
  3) General study 1 2 3 N
  4) Directing laboratory activities 1 2 3 N
  5) Consultation with students 1 2 3 N
  6) Consultation with other faculty 1 2 3 N
  7) Other (specify) ____________________ 1 2 3 N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the electronics laboratory area(s)
  1) Lecture/demonstration space to:
    a) General test bench area(s) 1 2 3 N
    b) Printed circuit area(s) 1 2 3 N
    c) Demonstration equipment storage space 1 2 3 N
    d) Instrument storage space 1 2 3 N
    e) Apparatus storage space 1 2 3 N
    f) Reference material space 1 2 3 N
    g) Office space 1 2 3 N
    h) Other (specify) ________________ 1 2 3 N
  2) General test bench area(s) to:
    a) Printed circuit area(s) 1 2 3 N
    b) Demonstration equipment storage area 1 2 3 N
    c) Instrument storage space 1 2 3 N
    d) Apparatus storage space 1 2 3 N
    e) Reference material space 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

- f) Office space 1 2 3 N
- g) Other (specify) ______________ 1 2 3 N
- 3) Printed circuit area(s) to:
  - a) Demonstration equipment storage area 1 2 3 N
  - b) Instrument storage space 1 2 3 N
  - c) Apparatus storage space 1 2 3 N
  - d) Reference material space 1 2 3 N
  - e) Office space 1 2 3 N
  - f) Other (specify) ______________ 1 2 3 N
- 4) Demonstration equipment storage space to:
  - a) Instrument storage space 1 2 3 N
  - b) Apparatus storage space 1 2 3 N
  - c) Reference material space 1 2 3 N
  - d) Office space 1 2 3 N
  - e) Other (specify) ______________ 1 2 3 N
- 5) Instrument storage space to:
  - a) Apparatus storage space 1 2 3 N
  - b) Reference material space 1 2 3 N
  - c) Office space 1 2 3 N
  - d) Other (specify) ______________ 1 2 3 N
- 6) Apparatus storage space to:
  - a) Reference material space 1 2 3 N
  - b) Office space 1 2 3 N
  - c) Other (specify) ______________ 1 2 3 N
- 7) Reference material space to:
  - a) Office space 1 2 3 N
  - b) Other (specify) ______________ 1 2 3 N
- 8) Office space to:
  - Other (specify) ______________ 1 2 3 N
- 9) Electronics laboratory to:
  - a) Instructional materials center 1 2 3 N
  - b) Offices 1 2 3 N
  - c) Building entrance 1 2 3 N
  - d) Other instructional areas 1 2 3 N
  - e) Other building areas (specify)
    - ______________________ 1 2 3 N
    - ______________________ 1 2 3 N

5. Furniture and equipment

- a. Power distribution panel
  - 1) Single phase 115 volt ac 1 2 3 N
  - 2) Direct current (variable voltage) 1 2 3 N
  - 3) Waveform voltages 1 2 3 N
  - 4) Interconnection facilities 1 2 3 N
- b. Test benches
  - 1) Isolated units 1 2 3 N
  - 2) Interconnected units 1 2 3 N
  - 3) Island type 1 2 3 N

FORM K

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

4) Drawer(s) under	1 2 3 N
5) Chairs or stools	1 2 3 N
c. Office furniture	
1) Desk	1 2 3 N
2) Chair	1 2 3 N
3) Book case	1 2 3 N
4) Conference table	1 2 3 N
5) Chalkboard	1 2 3 N
6) Other (specify) ________________	1 2 3 N
d. Components for experiments	
1) Discrete resistances	1 2 3 N
2) Resistance boxes (decade or substitution)	1 2 3 N
3) Discrete capacitors	1 2 3 N
4) Capacitance boxes	1 2 3 N
5) Discrete inductances	1 2 3 N
6) Inductance boxes	1 2 3 N
7) Test leads	1 2 3 N
8) Printed circuit boards	1 2 3 N
9) Breadboarded circuits	1 2 3 N
10) Integrated circuits	1 2 3 N
11) Interconnection boards	1 2 3 N
12) Vacuum and gas tubes	1 2 3 N
13) Solid state devices	1 2 3 N
14) Magnetic devices	1 2 3 N
15) Transformers	1 2 3 N
16) Other (specify) ________________	1 2 3 N
e. Instrumentation	
1) Oscilloscopes	1 2 3 N
a) Number required	________
b) Specifications	________
c) Rating	________
2) Scope cameras	1 2 3 N
a) Number required	________
b) Specifications	________
c) Rating	________
3) Electronic counters	1 2 3 N
a) Number required	________
b) Specifications	________
c) Rating	________
4) Multimeters	1 2 3 N
a) Number required	________
b) Specifications	________
c) Rating	________
5) VTVM (electronic voltmeters)	1 2 3 N
a) Number required	________
b) Specifications	________
c) Rating	________
6) Panel instruments (angle stand)	
a) Milliammeters	1 2 3 N

FORM K

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

(1) Number required ____________
(2) Specifications ____________
(3) Rating ____________
b) Voltmeters 1 2 3 N
(1) Number required ____________
(2) Specifications ____________
(3) Rating ____________
7) Bridges 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
8) Calibration equipment 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
9) Function generators 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
10) Wave analyzers 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
11) Curve tracers 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
12) Analog computer trainers 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
13) Digital computer trainers 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
14) Microwave demonstration equipment 1 2 3 N
a) Number required ____________
b) Specifications ____________
c) Rating ____________
15) Other (specify)
____ 1 2 3 N
____ 1 2 3 N

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electronics laboratory area(s).

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b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electronics laboratory area(s).

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c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electronics laboratory area(s).

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d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electronics laboratory area(s).

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e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the electronics laboratory area(s).

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7. Vertical instructional surfaces

a. Chalkboard	Yes No
1) Wall-mounted	P A NA
Number of lineal feet	________
2) Portable	P A NA
a) Number of lineal feet	________
b) Provision for storage	Yes No
b. Tack board	Yes No
Number of lineal feet	________
c. Pegboard	Yes No
Number of lineal feet	________

FORM K

8. Minimum floor areas required in square feet

   a. Floor area in square feet for the entire electronics laboratory area ________
   b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program
      1) Lecture/demonstration space ________
      2) General test bench area(s) ________
      3) Printed circuit area(s) ________
      4) Demonstration equipment storage area ________
      5) Instrument storage space ________
      6) Apparatus storage space ________
      7) Reference material space ________
      8) Office space ________
      9) Other (specify) ____________________ ________

9. Other important factors to be considered in the planning of the electronics laboratory area(s) are:

FORM L

DESCRIPTION OF ENGINEERING DRAWING LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The engineering drawing laboratory area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with ______ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use area(s)	Yes	No

2. Student capacity required for scheduled activities (see Form E) ______

3. Student and instructor activities in various space divisions within the engineering drafting and electrical design area(s). Indicate the extent to which each activity will occur.

a. Lecture-drawing space				
1) Lecture purposes	1	2	3	N
2) Student drafting	1	2	3	N
3) ______	1	2	3	N
b. Reference space				
1) Student referencing purposes	1	2	3	N
2) Storage of reference material	1	2	3	N
3) Storage of drafting materials	1	2	3	N
4) ______	1	2	3	N
c. Reproduction area				
1) Making copies of prints	1	2	3	N
2) Storage of prints	1	2	3	N
3) ______	1	2	3	N
d. Clean-up space				
1) Student washing	1	2	3	N
2) Instrument cleaning	1	2	3	N
3) ______	1	2	3	N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the engineering drafting and electrical design area(s)

1) Lecture-drawing space to:				
a) Reproduction space	1	2	3	N
b) Reference space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

c) Clean-up space	1 2 3 N
2) Reference space to:	
a) Reproduction space	1 2 3 N
b) Clean-up space to	1 2 3 N
3) Reproduction space to:	
Clean-up space	1 2 3 N

5. Equipment

a. Drafting machines	Yes No
1) Number required	
2) Description	
b. Instructors' table	Yes No
1) Number required	
2) Description	
c. Drafting tables	Yes No
1) Number required	
2) Description	
d. Stools	Yes No
1) Number required	
2) Description	
e. Print copy device	Yes No
1) Number required	
2) Description	
f. Print storage cabinet	Yes No
1) Number required	
2) Description	
g. Reference material cabinet	Yes No
1) Number required	
2) Description	
h. Mechanical lettering aids	Yes No
1) Number required	
2) Description	
i. Sink	Yes No
1) Number required	
2) Description	

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical drafting and design area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electrical drafting and design area(s).

____

____

____

____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electrical drafting and design area(s).

____

____

____

____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electrical drafting and design area(s).

____

____

____

____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special considerations which have implications for design of the electrical drafting and design area(s).

____

____

____

____

7. Vertical instructional surfaces

a. Chalkboard	Yes		No
1) Wall-mounted	P	A	NA
Number of lineal feet	________		
2) Portable	P	A	NA
a) Number of lineal feet	________		
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet	________		
c. Pegboard	Yes		No
Number of lineal feet	________		

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire drafting room area ________

FORM L

b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program.
   1) Storage space
      a) Copy machine storage space __________
      b) Print storage space __________
      c) Reference material storage space __________
   2) Lecture and drawing space __________
   3) Reference space __________
   4) Reproduction space __________
   5) Clean-up space __________

9. Other important factors to be considered in the planning of the electrical drafting and design area(s) are:

FORM M

DESCRIPTION OF COMPUTER PROGRAMMING LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The computer programming laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with ________ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) ____________

3. Student and instructor activities in various space divisions with the computer programming laboratory area(s). Indicate the extent to which each activity will occur.

a. On-line equipment space				
1) Acquiring techniques of machine operation	1	2	3	N
2) Acquiring diagnostic interpretation skills	1	2	3	N
3) Acquiring techniques of other on-line equipment (specify)				
a) ____________________	1	2	3	N
b) ____________________	1	2	3	N
c) ____________________	1	2	3	N
b. Off-line equipment space				
1) Acquiring techniques of keypunch operation	1	2	3	N
2) Acquiring techniques of printer operation	1	2	3	N
3) Acquiring techniques of other off-line equipment operation (specify)				
a) ____________________	1	2	3	N
b) ____________________	1	2	3	N
c) ____________________	1	2	3	N
c. Reference material space				
1) Instructional material storage	1	2	3	N
2) Equipment manual storage	1	2	3	N
3) Reference material storage	1	2	3	N
4) Reading table space	1	2	3	N
d. Work table space				

FORM M

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

Writing and debugging programs	1	2	3	N
e. Office space				
1) Directing laboratory activities	1	2	3	N
2) Consultation	1	2	3	N
f. Program storage space				
1) Card storage	1	2	3	N
2) Disk storage	1	2	3	N
3) Paper storage	1	2	3	N
4) Drum storage	1	2	3	N
g. Other activities in computer programming laboratory area(s)				
1) ______________________________	1	2	3	N
2) ______________________________	1	2	3	N
3) ______________________________	1	2	3	N
4) ______________________________	1	2	3	N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a. On-line equipment space to:				
1) Off-line equipment space	1	2	3	N
2) Reference material space	1	2	3	N
3) Work table space	1	2	3	N
4) Office space	1	2	3	N
5) Program storage space	1	2	3	N
6) Other activity space	1	2	3	N
b. Off-line equipment space to:				
1) Reference material space	1	2	3	N
2) Work table space	1	2	3	N
3) Office space	1	2	3	N
4) Program storage sapce	1	2	3	N
5) Other activity space	1	2	3	N
c. Reference material space to:				
1) Work table space	1	2	3	N
2) Office space	1	2	3	N
3) Program storage space	1	2	3	N
4) Other activity space	1	2	3	N
d. Work table space to:				
1) Office space	1	2	3	N
2) Program storage space	1	2	3	N
3) Other activity space	1	2	3	N
e. Office space to:				
1) Program storage space	1	2	3	N
2) Other activity space	1	2	3	N
f. Program storage space to:				
Other activity space	1	2	3	N
g. Computer programming laboratory area(s) to:				
1) Instructional material center	1	2	3	N

FORM M

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2) Building entrance 1 2 3 N
3) Delivery area 1 2 3 N
4) Other instructional areas (specify)
    a) ____________________ 1 2 3 N
    b) ____________________ 1 2 3 N
    c) ____________________ 1 2 3 N
5) Other building areas (specify)
    a) ____________________ 1 2 3 N
    b) ____________________ 1 2 3 N
    c) ____________________ 1 2 3 N

5. Furniture and equipment

a. Central processing unit
    1) Time share Yes No
    2) Core capacity __________
    3) Extra on-line storage
        a) Disk __________
        b) Core __________
        c) Magnetic tape __________
        d) Paper tape __________
        e) Drum __________
        f) Other (specify) ____________ __________
b. Card reader Yes No
    1) Type __________
    2) Combined with card punch Yes No
c. On-line printer Yes No
    Type __________
d. On-line plotter Yes No
    Type __________
e. Card punch Yes No
    1) Type __________
    2) Combined with card reader Yes No
f. Magnetic tape unit Yes No
    Type __________
g. Key punch equipment Yes No
    1) Type __________
    2) Number required __________
h. Paper tape reader Yes No
    Type __________
i. Paper tape punch Yes No
    Type __________
j. Time share terminals Yes No
    Type __________
k. Disk storage cabinets Yes No
    1) Number required __________
    2) Type __________
1. Card storage cabinet Yes No
    1) Number required __________

	2) Type	
m.	Magnetic tape storage cabinet	Yes No
	1) Number required	
	2) Type	
n.	Paper tape storage cabinet	Yes No
	1) Number required	
	2) Type	
o.	Desk for laboratory assistant(s)	Yes No
	1) Number required	
	2) Type	
p.	Chair for laboratory assistant(s)	Yes No
	1) Number required	
	2) Type	
q.	Student work table	Yes No
	Size	
r.	Student chairs	Yes No
	1) Number required	
	2) Folding	P A NA
	3) Provision for storage required	Yes No
	4) Type	
s.	Office desk	Yes No
	Size	
t.	Office chair	Yes No
	1) Number required	
	2) Type	
u.	Book case	Yes No
	Type	
v.	Filing cabinet	Yes No
	Number of drawers	
w.	Air conditioner for maintenance of temperature of central processing unit	Yes No
	Input feeder size	
x.	Desk calculator	Yes No
	1) Stored program type	Yes No
	2) Type	
y.	Other equipment required for the computer programming laboratory area(s). Give description in quantities:	

____
____
____

6. Environmental factors.

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the computer programming laboratory area(s).

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b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the computer programming laboratory area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the computer programming laboratory area(s).

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the computer programming laboratory area(s).

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the computer programming laboratory area(s).

7. Vertical instructional surfaces

a. Chalkboard	Yes No
1) Wall-mounted	P A NA
Number of lineal feet	____
2) Portable	P A NA
a) Number of lineal feet	____
b) Provision for storage	Yes No
b. Tack board	Yes No
Number of lineal feet	____
c. Pegboard	Yes No
Number of lineal feet	____

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire computer programming laboratory area(s) ____

b. If distinct space divisions are desired according to function, give minimum floor area requirements in square feet for each of the following areas if included in the desired program.

1) On-line equipment space __________
2) Off-line equipment space __________
3) Reference material space __________
4) Work table space __________
5) Office space __________
6) Other activity space (specify)
   ______________________________ __________
   ______________________________ __________
   ______________________________ __________

9. Special utility services required

Electricity

1) Service for computer system __________
2) Service for air conditioner __________
3) Number of outlets __________
4) Special lighting requirements (specify)
   ______________________________ __________
   ______________________________ __________
   ______________________________ __________
5) Special wiring requirements
   a) Instructional TV __________
   b) Intercom __________
   c) Share-time system connections __________
   d) Other __________

10. Other important factors to be considered in the planning of the computer programming laboratory are as follows:

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FORM N

DESCRIPTION OF COMPUTER AND CONTROL SYSTEMS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The computer and control systems laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with __________ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) ____________

3. Student and instructor activities in various space divisions within the computer and control systems laboratory area(s). Indicate the extent to which each activity will occur.

a. Lecture/demonstration space				
1) Discussing laboratory procedure	1	2	3	N
2) Using visual instructional aids	1	2	3	N
3) Calculating laboratory results	1	2	3	N
4) Other (specify) ____________________	1	2	3	N
b. Analog computer systems space				
1) Operating the analog computer	1	2	3	N
2) Using on-line plotter	1	2	3	N
3) Using oscilloscope	1	2	3	N
4) Using other equipment (specify) ____________________	1	2	3	N
c. Student patch-panel space				
1) Putting problems onto patch panels	1	2	3	N
2) Other (specify) ____________________	1	2	3	N
d. Analog computer system storage space				
1) Available patch-panel storage	1	2	3	N
2) Student patch-panel storage	1	2	3	N
3) Faculty patch-panel storage	1	2	3	N
4) Oscilloscope storage	1	2	3	N
5) Lead storage	1	2	3	N
e. Digital computer trainer space				
1) Operating the digital computer trainer	1	2	3	N
2) Other (specify) ____________________	1	2	3	N
f. Digital computer trainer storage space				
1) "Hardware" storage	1	2	3	N
2) Lead storage	1	2	3	N
3) Other (specify) ____________________	1	2	3	N

FORM N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

g.	DC servomechanism space				
	Performing demonstrations and experiments	1	2	3	N
h.	AC servomechanism space				
	Performing demonstrations and experiments	1	2	3	N
i.	Hydraulic servomechanism space				
	Performing demonstrations and experiments	1	2	3	N
j.	Fluidics (pneumatic) control system space				
	Performing demonstrations and experiments	1	2	3	N
k.	Stepping motor control systems space				
	Performing demonstrations and experiments	1	2	3	N
l.	Reference material space				
	1) Instructional material storage	1	2	3	N
	2) Equipment manuals storage	1	2	3	N
	3) Reference material storage	1	2	3	N
	4) Reading table space	1	2	3	N
m.	Office space				
	1) Directing laboratory activities	1	2	3	N
	2) Consultation	1	2	3	N
	3) Other (specify) ________________	1	2	3	N
n.	Other activities in computer and control systems laboratory area(s)				
	________________________________	1	2	3	N
	________________________________	1	2	3	N
	________________________________	1	2	3	N
	________________________________	1	2	3	N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a.	Lecture/demonstration space to:				
	1) Analog computer systems space	1	2	3	N
	2) Student patch-panel space	1	2	3	N
	3) Analog computer system storage space	1	2	3	N
	4) Digital computer trainer space	1	2	3	N
	5) Digital computer trainer storage space	1	2	3	N
	6) DC servomechanism space	1	2	3	N
	7) AC servomechanism space	1	2	3	N
	8) Hydraulic servomechanism space	1	2	3	N
	9) Fluidics (pneumatic) control system space	1	2	3	N
	10) Stepping motor control system space	1	2	3	N
	11) Reference material space	1	2	3	N
	12) Office space	1	2	3	N
	13) Other activity space	1	2	3	N
b.	Analog computer system space to:				
	1) Student patch-panel space	1	2	3	N
	2) Analog computer system storage space	1	2	3	N
	3) Digital computer trainer space	1	2	3	N
	4) Digital computer trainer storage space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

5) DC servomechanism space 1 2 3 N
6) AC servomechanism space 1 2 3 N
7) Hydraulic servomechanism space 1 2 3 N
8) Fluidic (pneumatic) control system space 1 2 3 N
9) Stepping motor control system space 1 2 3 N
10) Reference material space 1 2 3 N
11) Office space 1 2 3 N
12) Other activity space 1 2 3 N

c. Student patch-panel space to:
1) Analog computer system storage space 1 2 3 N
2) Digital computer trainer space 1 2 3 N
3) Digital computer trainer storage space 1 2 3 N
4) DC servomechanism space 1 2 3 N
5) AC servomechanism space 1 2 3 N
6) Hydraulic servomechanism space 1 2 3 N
7) Fluidics (pneumatic) control system space 1 2 3 N
8) Stepping motor control system space 1 2 3 N
9) Reference material space 1 2 3 N
10) Office space 1 2 3 N
11) Other activity space 1 2 3 N

d. Analog computer system storage space to:
1) Digital computer trainer space 1 2 3 N
2) Digital computer trainer storage space 1 2 3 N
3) DC servomechanism space 1 2 3 N
4) AC servomechanism space 1 2 3 N
5) Hydraulic servomechanism space 1 2 3 N
6) Fluidic (pneumatic) control system space 1 2 3 N
7) Stepping motor control system space 1 2 3 N
8) Reference material space 1 2 3 N
9) Office space 1 2 3 N
10) Other activity space 1 2 3 N

e. Digital computer trainer space to:
1) Digital computer trainer storage space 1 2 3 N
2) DC servomechanism space 1 2 3 N
3) AC servomechanism space 1 2 3 N
4) Hydraulic servomechanism space 1 2 3 N
5) Fluidic (pneumatic) control system space 1 2 3 N
6) Stepping motor control system space 1 2 3 N
7) Reference material space 1 2 3 N
8) Office space 1 2 3 N
9) Other activity space 1 2 3 N

f. Digital computer trainer storage space to:
1) DC servomechanism space 1 2 3 N
2) AC servomechanism space 1 2 3 N
3) Hydraulic servomechanism space 1 2 3 N
4) Fluidic (pneumatic) control system space 1 2 3 N
5) Stepping motor control system space 1 2 3 N
6) Reference material space 1 2 3 N
7) Office space 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

	8) Other activity space	1	2	3	N
g.	DC servomechanism space to:				
	1) AC servomechanism space	1	2	3	N
	2) Hydraulic servomechanism space	1	2	3	N
	3) Fluidic (pneumatic) control system space	1	2	3	N
	4) Stepping motor control system space	1	2	3	N
	5) Reference material space	1	2	3	N
	6) Office space	1	2	3	N
	7) Other activity space	1	2	3	N
h.	AC servomechanism space to:				
	1) Hydraulic servomechanism space	1	2	3	N
	2) Fluidic (pneumatic) control system space	1	2	3	N
	3) Stepping motor control systems space	1	2	3	N
	4) Reference material space	1	2	3	N
	5) Office space	1	2	3	N
	6) Other activity space	1	2	3	N
i.	Hydraulic servomechanism space to:				
	1) Fluidic (pneumatic) control system space	1	2	3	N
	2) Stepping motor control system space	1	2	3	N
	3) Reference material space	1	2	3	N
	4) Office space	1	2	3	N
	5) Other activity space	1	2	3	N
j.	Fluidic (pneumatic) control system space to:				
	1) Stepping motor control system space	1	2	3	N
	2) Reference material space	1	2	3	N
	3) Office space	1	2	3	N
	4) Other activity space	1	2	3	N
k.	Stepping motor control system space to:				
	1) Reference material space	1	2	3	N
	2) Office space	1	2	3	N
	3) Other activity space	1	2	3	N
l.	Reference material space to:				
	1) Office space	1	2	3	N
	2) Other activity space	1	2	3	N
m.	Office space to:				
	Other activity space	1	2	3	N
n.	Other spaces in computer and control systems laboratory area(s)				
	1) Instructional materials center	1	2	3	N
	2) Offices	1	2	3	N
	3) Building entrance	1	2	3	N
	4) Other instructional areas	1	2	3	N
	5) Other building areas (specify)				
	____________________	1	2	3	N
	____________________	1	2	3	N
	____________________	1	2	3	N
	____________________	1	2	3	N

5. Furniture and equipment

FORM N

a.	Analog computer	Yes	No
	Number required		
b.	Computer patch-panels	Yes	No
	Number required		
c.	X-Y plotter	Yes	No
	Number required		
d.	Oscilloscope	Yes	No
	Number required		
e.	Computer table and storage cabinet	Yes	No
	Number required		
f.	Patch-panel work table	Yes	No
	Number required		
g.	Digital computer trainer	Yes	No
	Number required		
h.	Digital computer equipment storage cabinet	Yes	No
	Number required		
i.	DC servomechanism training apparatus	Yes	No
	Number required		
j.	AC servomechanism training apparatus	Yes	No
	Number required		
k.	Hydraulic servomechanism training apparatus	Yes	No
	Number required		
l.	Fluidic (pneumatic) control system apparatus	Yes	No
	Number required		
m.	Stepping motor control system apparatus	Yes	No
	Number required		
n.	Instrument storage	Yes	No
	1) Small instrument storage cabinets	Yes	No
	Number required		
	2) Cart or caster mounted instrument storage	Yes	No
	Number required		
o.	Work tables	Yes	No
	1) Number required		
	2) Size		
p.	Student chairs	Yes	No
	1) Number required		
	2) Type		
q.	Patch-panel storage cabinet	Yes	No
	Capacity		
r.	Hardware storage cabinets	Yes	No
	1) Number required		
	2) Size		
s.	Office desk	Yes	No
	1) Number required		
	2) Size		
t.	Office chair	Yes	No
	1) Number required		
	2) Type		
u.	Book case	Yes	No
	1) Number required		
	2) Type		
v.	Filing cabinet	Yes	No
	Number of drawers		

w. Other equipment required for the computer and control systems laboratory area(s). Give description and quantities:

____

____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the computer and control systems laboratory area(s).

____

____

____

____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the computer and control systems laboratory area(s).

____

____

____

____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the computer and control systems laboratory area(s).

____

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____

____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the computer and control systems laboratory area(s).

____

____

____

____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the computer and control systems laboratory area(s).

____

____

____

____

FORM N

7. Vertical instructional surfaces

   a. Chalkboard — Yes No
      1) Wall-mounted — P A NA
         Number of lineal feet ________
      2) Portable — P A NA
         a) Number of lineal feet ________
         b) Provision for storage — Yes No
   b. Tack board — Yes No
      Number of lineal feet ________
   c. Pegboard — Yes No
      Number of lineal feet ________

8. Minimum floor areas required in square feet

   a. Floor area in square feet for the entire computer and control systems laboratory area(s) ________
   b. If distinct space divisions are desired according to function, give minimum floor area requirements in square feet for each of the following areas if included in the desired rpogram.
      1) Teaching space ________
      2) Analog computer equipment space ________
      3) Digital computer equipment space ________
      4) Servomechanism equipment space ________
      5) Fluidic equipment space ________
      6) Stepping motor equipment space ________
      7) Storage space ________
      8) Office space ________
      9) Other (specify) ________________ ________

9. Special utility services required

   a. Electricity
      1) Service size ________
      2) Number of outlets ________
   b. Special lighting requirements (specify)
      ____
      ____
      ____
   c. Special wiring requirements
      1) Instructional TV ________
      2) Intercom ________
      3) Other (specify) ________________ ________
   d. Hydraulic (specify)
      ____
      ____
      ____
   e. Pneumatic (specify)
      ____
      ____
      ____

FORM N

10. Other important factors to be considered in the planning of the computer and control systems laboratory are:

FORM O

DESCRIPTION OF STUDENT SELF-STUDY LABORATORY AREAS TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The student self-study laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with ____________ (specify) laboratory area(s).	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) ____________

3. Student and instructor activities in various space divisions within the student self-study laboratory area(s). Indicate the extent to which each activity will occur.

a. Closed loop projector space Viewing 8 mm closed loop films	1	2	3	N
b. Audio tape recorder space Listening to prepared tapes	1	2	3	N
c. Video tape monitor Viewing prepared tapes	1	2	3	N
d. 35 mm film strip projector and record player Viewing and hearing film strips	1	2	3	N
f. Desk top computer Problem solving	1	2	3	N
g. Microfilm reader and copier Viewing microfilm	1	2	3	N
h. Coin slot copier Making copies of reference material	1	2	3	N
i. Reference space				
1) Instructional material storage				
a) Audio tapes	1	2	3	N
b) Video tapes	1	2	3	N
c) 35 mm film strips and records	1	2	3	N
d) Computer programs	1	2	3	N
e) 8 mm closed loop films	1	2	3	N
f) Copier supplies	1	2	3	N
g) Microfilms	1	2	3	N
h) Microfiche	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

- 2) Manufacturers' equipment manuals storage 1 2 3 N
- 3) Supplementary reading materials storage 1 2 3 N
- 4) Periodical display and storage 1 2 3 N
- 5) Reading table space 1 2 3 N

j. Office space
  - Supervising lab activities 1 2 3 N

k. Other activities in student self-study laboratory area
  - ____ 1 2 3 N
  - ____ 1 2 3 N
  - ____ 1 2 3 N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a. Closed loop projector space to:
  - 1) Audio tape recorder space 1 2 3 N
  - 2) Video tape monitor space 1 2 3 N
  - 3) 35 mm film strip projector space 1 2 3 N
  - 4) Microfiche reader space 1 2 3 N
  - 5) Desk top computer space 1 2 3 N
  - 6) Microfilm reader and copier space 1 2 3 N
  - 7) Coin slot copier space 1 2 3 N
  - 8) Reference space 1 2 3 N
  - 9) Office space 1 2 3 N
  - 10) Other activity space 1 2 3 N

b. Audio tape recorder space to:
  - 1) Video tape monitor space 1 2 3 N
  - 2) 35 mm film strip projector space 1 2 3 N
  - 3) Microfiche reader space 1 2 3 N
  - 4) Desk top computer space 1 2 3 N
  - 5) Microfilm reader and copier space 1 2 3 N
  - 6) Coin slot copier space 1 2 3 N
  - 7) Reference space 1 2 3 N
  - 8) Office space 1 2 3 N
  - 9) Other activity space 1 2 3 N

c. Video tape monitor space to:
  - 1) 35 mm film strip projector space 1 2 3 N
  - 2) Microfiche reader space 1 2 3 N
  - 3) Desk top computer space 1 2 3 N
  - 4) Microfilm reader and copier space 1 2 3 N
  - 5) Coin slot copier space 1 2 3 N
  - 6) Reference space 1 2 3 N
  - 7) Office space 1 2 3 N
  - 8) Other activity space 1 2 3 N

d. 35 mm film strip projector space to:
  - 1) Microfiche reader space 1 2 3 N
  - 2) Desk top computer space 1 2 3 N

FORM O

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

3) Microfilm reader and copier space	1	2	3	N
4) Coin slot copier space	1	2	3	N
5) Reference space	1	2	3	N
6) Office space	1	2	3	N
7) Other activity space	1	2	3	N
e. Microfiche reader space to:				
1) Desk top computer space	1	2	3	N
2) Microfilm reader and copier space	1	2	3	N
3) Coin slot copier space	1	2	3	N
4) Reference space	1	2	3	N
5) Office space	1	2	3	N
6) Other activity space	1	2	3	N
f. Desk top computer space to:				
1) Microfilm reader and copier space	1	2	3	N
2) Coin slot copier space	1	2	3	N
3) Reference space	1	2	3	N
4) Office space	1	2	3	N
5) Other activity space	1	2	3	N
g. Microfilm reader and copier space to:				
1) Coin slot copier space	1	2	3	N
2) Reference space	1	2	3	N
3) Office space	1	2	3	N
4) Other activity space	1	2	3	N
h. Coin slot copier space to:				
1) Reference space	1	2	3	N
2) Office space	1	2	3	N
3) Other activity space	1	2	3	N
i. Reference space to:				
1) Office space	1	2	3	N
2) Other activity space	1	2	3	N
j. Office space to:				
Other activity space	1	2	3	N
k. Student-self study laboratory area(s) to:				
1) Instructional material center	1	2	3	N
2) Building entrance	1	2	3	N
3) Delivery area	1	2	3	N
4) Other instructional areas (specify)				
______________________________	1	2	3	N
______________________________	1	2	3	N
______________________________	1	2	3	N
5) Other building areas (specify)				
______________________________	1	2	3	N
______________________________	1	2	3	N
______________________________	1	2	3	N

5. Furniture and equipment

a. 8 mm closed loop projectors and small screens	Yes	No

FORM O

1) Number required sound ____
2) Number required silent ____

b. Audio tape recorders Yes No
1) Number required cartridge ____
2) Number required reel ____

c. Multiple listening equipment (4 per set) Yes No
Number sets ____

d. Video playback machine Yes No
Number required ____

e. Video monitors Yes No
1) Number required--color ____
2) Number required--black and white ____

f. 35 mm film strip projectors and record player Yes No
1) Number with built-in screen ____
2) Number without built-in screen ____

g. Microfiche reader Yes No
Number required ____

h. Desk top computer Yes No
1) Number self-contained ____
2) Number shared time ____

i. Microfilm reader Yes No
1) Number with copier attachment ____
2) Number without copier ____

j. Coin operated copiers Yes No
1) Number required ____
2) Type ____

k. Study carrels Yes No
1) Number required ____
2) Type or size ____

l. Student chairs Yes No
1) Number required ____
2) Type ____

m. 8 mm loop storage cabinet Yes No
Capacity ____

n. Audio tape storage Yes No
Capacity ____

o. Video tape storage cabinet Yes No
Capacity ____

p. Microfilm storage cabinet Yes No
Capacity ____

q. Microfiche storage cabinet Yes No
Capacity ____

r. Program storage cabinet Yes No
1) Capacity ____
2) Type ____

s. Copier supply cabinet Yes No
Type ____

t. Periodical display cabinet Yes No
Type ____

u. Instructional material storage cabinet Yes No
Type ____

v. Office desk Yes No
Size ____

w. Office chair — Yes No
1) Number required ______
2) Type ______

x. Book case — Yes No
Type ______

y. Filing cabinet — Yes No
Number of drawers ______

z. Other equipment required for the student self-study laboratory area(s). Give description and quantities.

______ ______
______ ______
______ ______
______ ______

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the student self-study laboratory area(s).

______
______
______

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the student self-study laboratory area(s).

______
______
______

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the student self-study laboratory area(s).

______
______
______

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the student self-study laboratory area(s).

______
______
______

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the student self-study laboratory area(s).

____
____
____
____

7. Vertical instructional surfaces

a. Chalkboard	Yes No
1) Wall-mounted	P A NA
Number of lineal feet	________
2) Portable	P A NA
a) Number of lineal feet	________
b) Provision for storage	Yes No
b. Tack board	Yes No
Number of lineal feet	
c. Pegboard	
Number of lineal feet	________

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire student self-study laboratory

b. If distinct space divisions are desired according to function, give minimum floor area requirements in square feet for each of the following areas if included in the desired program.

1) Closed loop projector use space ________
2) Audio tape recorder use space ________
3) Video tape recorder use space ________
4) 35 mm film strip projector use space ________
5) Microfiche reader use space ________
6) Desk top computer use space ________
7) Coin slot copier space ________
8) Carrel space ________
9) Office space ________
10) Storage space ________
11) Other (specify) ________________ ________

9. Special utility services required

Electricity
1) Service size ________
2) Number of outlets ________
3) Other (specify) ________________ ________
4) Special lighting requirements (specify)

________________________________ ________
________________________________ ________
________________________________ ________
________________________________ ________
________________________________ ________
________________________________ ________

FORM O

5) Special wiring requirements
   a) Instructional TV ____________
   b) Intercom ____________
   c) Shared time computer wiring ____________
   d) Other ____________

10. Other important factors to be considered in the planning of the student self-study laboratory are:

____

PART IV

ANNOTATED BIBLIOGRAPHY

GENERAL FACILITY PLANNING

American Association of School Administrators. *Planning America's School Buildings*. Washington, D. C.: The Association, 1960.

Contributors to this publication were teachers, supervisors, administrators, architects, engineers, school board members, and school plant planning specialists. In addition to background material on school house construction, the book deals with specific topics including school surveys, analysis and computation of space and facility needs, enrollment projections, building designs, site selection, finance, and building maintenance and operation. Many pictures and illustrations are found, along with sample forms and outlines, which can be used in the facility planning process. No special consideration is given to unique problems faced in the planning for vocational and technical education facilities.

Boles, H. W. *Step by Step to Better School Facilities*. New York: Holt, Rinehart, and Winston, 1965.

A textbook on overall planning procedures for new and improved school facilities. The typical topics (school surveys, building planning, site selection and acquisition, architectural planning, contracting for construction, and the equipping and furnishing of buildings) are covered. The only mention of vocational schools is on page 270 where the author quotes from another source:

> Vocational training should be de-emphasized in the schools since this training often becomes obsolete before it can be used; also, special "trade" and "vocational" schools should be discontinued, unless the vocational curriculum is liberal in approach and broad in character. Such schools are often used as dumping grounds for students who are not wanted elsewhere and often more than custodial care is provided for them. When more is provided, the skills taught are frequently too partial in nature.

Conrad, M. J. *Four Steps to New Schools*. Columbus, Ohio: Educational Administration and Facilities Division of the Bureau of Educational Research and Service. The Ohio State University.

A book prepared for the inexperienced school planner. The author emphasizes that a school building is an educational tool and should be designed to do the job they are intended to do. The four steps discussed are: 1) district-wide building survey; 2) educational planning; 3) architectural planning and construction; and 4) moving in and settling down. A glossary of important terms used in plant planning is located in the back of the book.

Conrad, M. J.; Wohlers, E. E.; and Griggs, Norman. *School Plant Planning: An Annotated Bibliography*. Columbus, Ohio: The Administration and Facilities Unit, School of Education, The Ohio State University, 1968.

A compilation of references in the following categories: general references; periodicals; overview of school plant field, district wide building survey; educational planning; the architect and his work; moving in and settling down; and related topics.

Finchum, R. N. *Extended Use of School Facilities*. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1967.

This manual is intended to assist officials of school districts who are planning programs for maximum use of school properties and who must develop policies and regulations for efficient management of such programs. Various schedules of facility use are illustrated for nine different school systems.

Green, A. C. *Educational Facilities With New Media*. Washington, D. C.: Department of Audiovisual Instruction, National Education Association, 1966.

This work is designed to meet the needs of three distinct groups interested in providing educational facilities. Report A: "A Guide for Policy Makers" is directed to boards, administrators, planning committees, and institutional planners. Report B: "A Guide for the Design of Professions" is designed for architects, planners, and design specialists and planning committees; and Report C: "A Technical Guide" is intended for design-architects, engineers, equipment and furniture suppliers, and media specialists.

National Council on School House Construction. *NCSC Guide for Planning Plants*. East Lansing, Michigan: The Council, 1964.

A basic reference on school plant planning and construction for use by superintendents, school board members, school plant planners, state department of education personnel, local school system officials, collegiate institutions, architects, lay advisory groups, and graduate students. Major topics

covered are: planning and programming educational plants; spaces and equipment for learning; non-instructional systems; space organization and economy and resources. Much attention is given to plant planning through a description of a survey technique used to determine and satisfy school plant needs for a community. Site selection, kinds of instructional spaces, sonic, termal, and visual environments, and best use of natural and plant resources are also treated.

North Carolina. Department of Public Instruction. *A Digest of Educational Planning*. Raleigh, North Carolina: The Department.

The contents of this book include a description of what educational planning is, when it is done, who does it, and how it is done. The three steps of planning are identified as 1) identification and analysis of educational and facility needs, 2) adapting and implementing plant improvement programs, and 3) completing and evaluating a process of the educational planning.

North Carolina. *Department of Public Instruction*. The Division of School Planning. School Design. Raleigh.

Basic principles of school design is the thrust of this publication. It focuses on the interrelationship of patterns of school activities, organization of activities on the site, design potentials for various sites, and the building design data necessary for communicating the school's needs to the architect.

School Planning Laboratory. *Spectrum of Electronic Teaching Aids in Education*. Stanford, California: Stanford University, 1965.

This publication seeks to suggest which learning functions can be served electronically to symbolize the nature and progressive complexity of each electronic system, and finally to estimate budgets which will provide for adequate systems in relation to engineering and warranty costs.

Strevell, W. H., and Burke, A. J. *Administration of the School Building Program*. New York: McGraw-Hill Book Company, Inc., 1959.

A comprehensive textbook on the administration of the school plant program. The book is organized into three major parts. Part I - "Policy Decisions" deals with school building needs studies and long-range planning. Part 2 - "Program Recommendations" deals with local study of plant needs, evaluation of existing plant, determination of additional plant needs, site selection and development, and the preparation of educational specifications. Part 3 - "Project Administration" is concerned with the financial aspects of a building program and with public relations. There is a brief mention of the objectives of vocational education as contrasted with the objectives of general education on page 12.

The Cost of a Schoolhouse. New York: Educational Facilities Laboratories, 1960.

This book deals with the cost of a schoolhouse and the process of planning and financing it. It provides median costs for various building elements, designates individual responsibilities in process of building, and discusses arrangement of space and environmental factors.

VOCATIONAL-TECHNICAL FACILITY PLANNING

American Vocational Association. *Developing Educational Specifications for Vocational and Practical Arts Facilities.* Washington, D. C.: The Association.

The purpose of this publication is to reduce the broad principles and processes of school plant planning to those most applicable to vocational and practical arts education. Effective techniques for developing educational specifications are suggested. The committee provides a sequential treatment of program and administrative considerations, desired space and educational program, special site arrangement features, special physical aspects of building, and the financial requirements for the project.

Calder, C. R. *Modern Media for Vocational-Technical Education.* Connecticut: State Department of Education, 1967.

A study of related literature on programmed instruction, instructional films, instructional television, and learning from various instructional media. It analyzes new instructional media approaches used at North Carolina's Fundamental Learning Laboratories System, and the integrated experience approach at Oakland Community College.

Chase, W. W.; Browne, J. W.; and Russo, M. *Basic Planning Guide for Vocational and Technical Education Facilities.* Washington, D. C.: Department of Health, Education, and Welfare, U. S. Government Printing Office, 1965.

A general guide that describes important steps to be followed in the planning for and construction of vocational and technical education facilities. Important topics covered are: the impact of the Vocational Education Act of 1963; surveys of area educational needs; use of consultant services; basic planning considerations; educational specifications; general planning; and school construction cost and outlay. Sample floor plans and picture illustrations of vocational schools are included.

McKee, R. L., and Ripley, K. J. *The Documentation of Steps to Establish a Technical College and the Evaluation of PERT as a Planning Tool for Educators.* Bailey's Crossroads, Virginia: Unpublished report, 1966.

An account of the procedures followed in the establishment of a technical college within a period of less than 90 days. The entire planning process and implementation is described along with the PERT technique which was applied. The author concluded the PERT (Program Evaluation and Review Technique) was effective in assisting the planners in reaching their objectives within a short period of time.

Stanford University. Trends in Facility Design-Vocational-Technical Continuing Information Program. Stanford, California: School of Education, 1966.

The pamphlet emphasizes the need for a total flexibility concept in school building. Consideration is given to the use of building components to provide flexibility in space, lighting, air-conditioning, sewage system, and the like.

U. S. Department of Health, Education, and Welfare. New Ideas and Construction for Vocational Education. Washington, D. C.: Unpublished, 1967.

A report on new trends in the construction of vocational education facilities. Among topics covered are occupational clusters, teaching techniques such as micro-teaching and educational television, facilities for handicapped children, educational parks, and unique problems faced by large city school systems. Special consideration is given to maximum utilization of vocational education facilities on an around-the-clock basis.

Valentine, I. E., and Conrad, M. J. Progress Report: Vocational-Technical Facilities Project. Columbus, Ohio: The Center for Vocational and Technical Education, The Ohio State University, 1967.

A report which relates the thinking of six outstanding consultants on various topics relating current trends in vocational-technical education and facility planning. Reviews the work of a local consortium consisting of three Center vocational specialists, three school plant planners, three representatives from the State Department of Education, three local school officials, and three practicing architects in defining problems, clarifying issues, suggesting approaches to organizing planning guides, and establishing guidelines for a series of facility planning guides in selected vocational and technical subject areas.

Wohlers, A. E. A Manual for Planning a Secondary School Building (Vocational Education). Columbus, Ohio: The Administration and Facilities Unit, School of Education, The Ohio State University, Pamphlet C-14.

A general facility planning guide for programs of vocational education. Principal topics covered include: 1) number of teaching stations; 2) types of teaching stations; 3) equipment needs; and 4) floor areas required. The planning manual also deals with spatial relationships of teaching facilities

and the utilization of auxiliary areas such as libraries, cafeterias, and administrative suites. Planners using the guide are directed to complete checklists and fill-in blanks with the necessary information pertinent to vocational facility planning.

ELECTRICAL TECHNOLOGY FACILITY PLANNING

U. S. Department of Health, Education and Welfare, Office of Education. Electrical Technology, A Suggested Two-Year Post-High School Curriculum. OE-80006, U.S.G.P.O., 1960.

U. S. Department of Health, Education and Welfare, Office of Education. Electronics Technology. OE-80006, U.S.G.P.O., 1960.

Illinois Board of Vocational Education and the University of Illinois, Electronic Technology, A Suggested Two-Year Post-High School Program. Engineering Technology Series No. 2. University of Illinois: 1964.

Illinois Board of Vocational Education and the University of Illinois. Electronic Technology, A Suggested Two-Year Post-High School Program. Engineering Technology Series No. 3. University of Illinois: 1967.

All four of these publications are surveys in depth, designed to give the reader the information necessary to plan curriculum, housing, equipment and facilities for a two-year technical curriculum. The recent University of Illinois studies are particularly valuable.

PUBLICATIONS OF THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION

RESEARCH SERIES

no.	name of publication	cost
1	A National Survey of Vocational Education Programs for Students with Special Needs. April 1967. 89+ [14] p. ED011041	$2.00
2	The Demand for and Selected Sources of Teachers in Vocational and Technical Education, State Directory. January 1967. 31+[5] p. ED012331	o
3	Research and Development Priorities in Technical Education. May 1967. 34 p. ED013888	o
4	Review and Synthesis of Research in Agricultural Education. August 1966. 140 p. ED011562	1.50
5	Review and Synthesis of Research in Business and Office Occupations Education. August 1966. 128 p. ED011566	o
6	Review and Synthesis of Research in Distributive Education. August 1966. 212 p. ED011565	o
7	Review and Synthesis of Research in Home Economics Education. August 1966. 104 p. ED011563	o
8	Review and Synthesis of Research in Industrial Arts Education. August 1966. 88 p. ED011564	o
9	Review and Synthesis of Research in Technical Education. August 1966. 69 p. ED011559	1.50
10	Review and Synthesis of Research in Trade and Industrial Education. August 1966. 76 p. ED011560	o
	Set of Seven Research Reviews (nos. 4-10)	10.00
11	The Emerging Role of State Education Departments with Specific Implications for Divisions of Vocational-Technical Education. 1967. ED016870	4.50
12	A Taxonomy of Office Activities for Business and Office Education. July 1968. 163 p. VT005935 RIE	2.75
13	Enlisted Men Separating from the Military Service as a Potential Source of Teachers for Vocational and Technical Schools. October 1967. 53 p. ED016131	*
14	Boost: Business and Office Education Student Training; Preliminary Report. 1967. 251 p. VT005131 RIE	3.00
18	Research Priorities in Technical Teacher Education: A Planning Model. October 1967. 48 p. ED016815	o
19	Implications of Women's Work Patterns for Vocational and Technical Education. October 1967. 70 p. ED016815	2.00
21	An Evaluation of Off-farm Agricultural Occupations Materials. October 1967. 74 p. ED016853	*

LEADERSHIP SERIES

no.	name of publication	cost
1	Report of a National Seminar on Agricultural Education, "Program Development and Research," August 9-13, 1965. 176 p. ED011036	*
2	Guidance in Vocational Education. Guidelines for Research and Practice. 1966. 181 p. ED011922	o
3	Guidelines for State Supervisors of Office Occupations Education. 1965. 84 p. VT001266 RIE	o
4	National Vocational-Technical Education Seminar on the Development and Coordination of Research by State Research Coordinating Units. 1966. 72 p. ED011042	o
5	A Report of the Business and Office Education Research Planning Conference. 1966. 116 p. ED013304	o
6	Program Development for Occupational Education. A Report of a National Seminar for Leaders in Home Economics Education, March 28-31, 1966. 118 p. ED011040	o
7	Report of a National Invitational Research Planning Conference on Trade and Industrial Teacher Education, May 23-27, 1966. 1966. 197 p. ED011043	2.00

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no.	name of publication	cost
8	Report of a National Seminar, "Evaluation and Program Planning in Agricultural Education," June 27-30, 1966. 1966. 129 p. ED011037	o
9	Health Occupations Education Centers: Report of a National Seminar held July 11-14, 1966. 1967. ED016823	o
10	Guidelines for Cooperative Education and Selected Materials from the National Seminar held August 1-5, 1966. 1967. 255 p. ED011044	o
11	Systems Under Development for Vocational Guidance. 1966. 60 p. ED011039	o
12	Compilation of Technical Education Instructional Materials--Supplement I. April 1967. 203 p. ED012340	3.00
13	Compilation of Technical Education Instructional Materials--Supplement II. April 1967. 242 p. ED011933	3.50
14	Educational Media in Vocational and Technical Education: Report of a National Seminar. 1967. 240 p. ED017730	o
15	Vocational-Technical Education: National Seminar Proceedings. 1968. 283 p. VT005627 RIE	3.25
16	National Program Development Institutes in Technical Education, Summer 1967: A Compilation of Selected Presentations and Instructional Materials. 194 p. VT005628 RIE	o

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1	Implications of Women's Work Patterns for Vocational and Technical Education: An Annotated Bibliography. 1967. 25 p. ED016812	1.50
2	Worker Adjustment: Youth in Transition from School to Work: An Annotated Bibliography. 1968. 135 p. VT005631 RIE	3.25

INFORMATION SERIES

name of publication	cost
Abstracts of Research and Related Materials in Vocational and Technical Education. Fall 1967. Quarterly.	9.00 per year
Abstracts of Instructional Materials in Vocational and Technical Education. Fall 1967. Quarterly.	9.00 per year
Rotated Display of Descriptors Used by the ERIC Clearinghouse on Vocational and Technical Education. 1967. 35 p.	1.50

OFF-FARM AGRICULTURAL OCCUPATIONS

Instructional Material in:

name of publication	cost
Agricultural Chemicals Technology (Course outline and eight modules) ED013894-ED013902	6.75
Agricultural Machinery--Service Occupations (Course outline and and sixteen modules) ED0127[illegible]-ED012777	7.50
Agricultural Supply--Sales and Service Occupations (Course outline and twelve modules) ED015232-ED015241	7.00
Horticulture--Service Occupations (Course outline and twelve modules) ED013290-ED013302	o
Occupational Guidance for Off-farm Agriculture. ED011030	.60
Organizing to Provide Agricultural Education for Off-farm Occupations. ED011032	o
Planning and Conducting Cooperative Occupational Experience in Off-farm Agriculture. ED011035	1.35
Policy and Administrative Decisions in Introducing Vocational and Technical Education in Agriculture for Off-farm Occupations. ED011033	.75
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